Inventory of measures, typology of non-intentional effects and a framework for policy packaging

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Deliverable 1

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Abstract

This document represents the conceptual foundations of the EU-FP7 OPTIC project. As such, it seeks to provide a range of theoretical resources with which to develop an informed and pragmatic understanding of the complex causal processes involved in contemporary transport policy-making at the European level. Specifically, this deliverable aims to further methodological advancement with respect to the identification, classification, *ex-ante* prevention and *ex-post* mitigation of policies' unintended effects, and the systematic manner in which individual policy measures may be combined so as to improve their effectiveness, acceptability and feasibility. Overall, we argue that policy packaging can offer a far greater potential for achieving policy targets and objectives than single policy measures deployed in isolation. Yet, a careful and relatively well designed process must be undertaken for such packages to be effective.

Executive Summary

Transport systems in the European Union are complex. It is increasingly evident, however, that standard policy measures designed to manage these systems are unable to recognise and respond in kind to this complexity and that this has profound implications for the effectiveness and efficiency of political interventions. Unless improvements are made to the manner in which contemporary transport systems are managed and governed, transport policy will be unable to ensure that the daily mobility of people, information and materials within the EU can proceed in a sustainable direction, without jeopardising broader social, economic and environmental objectives.

A major barrier to effective and efficient policy-making is the continued presence of isolated decision-making. This can result in situations arising where several independently-formulated and implemented policy measures are in action simultaneously. In certain instances this may be favourable, as measures that reduce may positively reinforce one another. In other instances, however, two or more measures may contradict one another, resulting in limited policy effectiveness and wasted resources. In essence, policy-making based upon relatively narrow conceptual considerations has two major implications: first, it can lead to the very real problem of unintended effects; and second, it fails to exploit the potential benefits of synergetic relationships between complementary measures.

It is this area of concern that the OPTIC project, as a whole, seeks to address. Broadly, it aims:

> *"to help identify in advance possible adverse effects of transport policy measures taken in isolation, and to develop methodologies for the design and implementation of optimal combinations of policy measures which reduce adverse effects and/or provide positive synergies."*

This first deliverable represents the conceptual cornerstone of the project and thus forms the basis for later work packages. As a stand-alone document, it makes two contributions. First, we develop a comprehensive typology of unintended effects that are liable to exist as a result of (well-intentioned) policy interventions in transport systems. The purpose of this typology is not to establish a universally applicable taxonomy for all aspects of intentions and effects of transport policies, but rather to create a schema tailored to the principle needs of policy-makers and associated actors. As a result, the typology is concerned with establishing conceptual clarity, providing a useful categorisation of types of non-intentional policy effects and supporting the design of policy packages. The final typology is extremely detailed and undertakes to analyse the nature of policy effects with respect to numerous variables. Nevertheless, its fundamental contributions are evident; it demonstrates the importance of actors' situational knowledge, the accuracy and breadth of their causal assumptions and the real and perceived range of their jurisdictional influence. Furthermore, and equally as important, it brings the issue of non-intentional effects to the fore; by acknowledging their existence, and by starting to define their characteristics, this analysis affords accounting for them in the early stages of policy design, thus reducing the need to take remedial action at a later date.

The second contribution of the deliverable is a proposed framework for effective and efficient policy packaging that has an in-built capacity to prevent and mitigate unintended effects. In supporting the efforts of later OPTIC work packages, it actively converges on a set of interrelated principles that logically support the project of policy packaging in its broadest guise. Following a review of policy packaging developments in previous EU-funded transport research, four 'core elements' of a policy package are outlined in accordance with key

academic and policy literature: primary measure(s); effectiveness measures, acceptability measures and feasibility measures. Attention is then directed to the procedural aspects of policy packaging, highlighting the importance of setting clear objectives, explicating causal assumptions, robustly evaluating distributional effects, acknowledging the salience of jurisdictional constraints and approaching policy design in an iterative manner. As discussed in Appendix 7.4, the framework outlined in this deliverable was positively received by a group of policy-making experts participating in a dedicated workshop held in Brussels in April 2010. This was a particularly informative event, and generated highly-constructive feedback on the strengths and limitations of the approach.

Finally, the content of this deliverable directly informs research efforts undertaken in Work Packages 3 and 4. WP3 examines to what extent current state-of-the-art modelling and forecasting techniques can facilitate the identification, *ex-ante*, of unintended effects and thus contribute to their prevention and mitigation. It also examines ways in which unavoidable unintended effects can be identified as early as possible and addressed through remedial measures. WP 4 examines various EU transport policy packages with the aim of identifying real-world 'best practice' examples of policy packaging techniques.

1 Introduction

1.1 Background

A wide variety of policy efforts and interventions are undertaken at different policy levels in order to promote efficient, accessible and environmentally sustainable transport systems. Meanwhile, it is widely recognised that such transport systems are highly complex and that their nature is dependent on multiple factors, not least in the European context. This means that the design and implementation of appropriate policy measures involve several challenges. One such challenge is to ensure that policies actually lead towards their intended objectives. This can be difficult to achieve given the presence of combined effects with other measures and unanticipated side-effects on other policy objectives or domains.

One approach to overcome these obstacles is to adopt integrated policy combinations or 'packages', based on comprehensive policy assessments. However, although integrated transport and the integration of transport with other policy domains has been discussed for several years, adoption of parallel individual measures is still the most preferred approach to designing an intervention, and often the only approach that seems feasible. Moreover, despite efforts to develop comprehensive assessment frameworks, policy analysis often remains confined to the study of impacts across a handful of input variables and a limited range of outcomes. There is thus a need for methodological advancement to support a move towards a more comprehensive and integrated understanding of transport and associated policies.

The overall objective of OPTIC is to help identify in advance possible adverse effects of transport policy measures taken in isolation, and to develop methodologies for the design and implementation of optimal combinations of policy measures which reduce adverse effects and/or provide positive synergies. The aim of the OPTIC project is thus to improve our collective ability to analyse the likely effects of transport policies and to develop methodologies and implementation strategies for systematic policy packaging.

1.2 Purpose and overview

There are four main roles for this deliverable, as reflected in its structure:

- to provide an overall perspective on available transport policy (including an inventory of measures and their effectiveness)
- to identify types and examples of 'unintended, adverse' (or counter-intentional) effects of policy interventions, and to develop a typology, which can help foresee and neutralise such effects in advance
- to develop a framework for 'policy packaging', that is combinations of policy measures into packages, which can consolidate and enhance desired impacts, while and at the same time reduce the possibilities for counter-intentional ones
- to provide a framework for other work packages in the OPTIC project

These topics are addressed in chapters 2, 3, and 4. As shown in Figure 1.1 below, the contributions made will directly support tasks undertaken in Work Package 3 and 4. Work Package 3, *Forecasting of synergies and adverse effects*, will draw heavily on chapters 3 and 4 as it seeks to identify various methods and models with which to aid the *ex ante* analysis of unintended, adverse effects. The typology of unintended effects from chapter 3

will be crucially valuable here, as will the procedural framework outlined in chapter 4, with its emphasis on distributional effects and causal reasoning. Work Package 4, *Best practice in package design*, will also derive considerable input from the procedural framework—extending this through the systematic evaluation of different types of policy packages. Also, results from this deliverable will feed into Work Package 5 *Barriers for and good practises of implementation*, which will look in more detail into policy packaging and implementation issues, including the analysis of selected case studies.

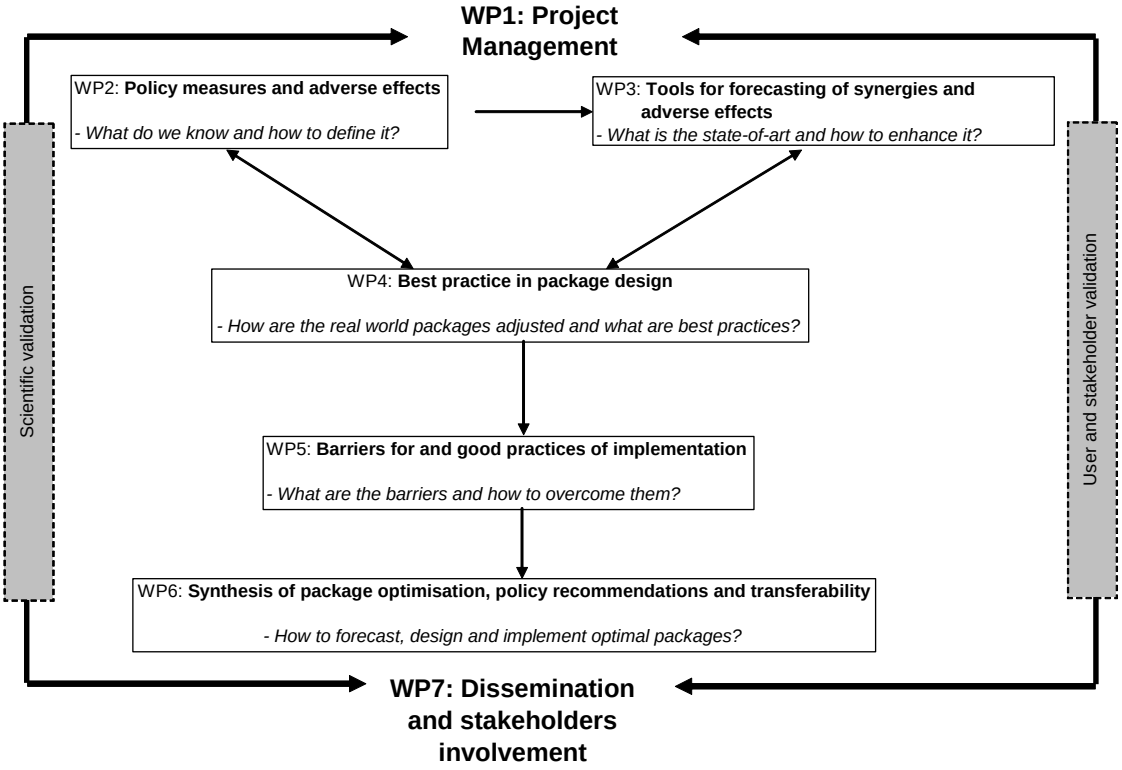

Figure 1.1 The structure of the OPTIC project.

1.3 Deliverable structure

Chapter 2 of this report deals with transport policy measures and the context of transport policy making, especially in the European setting. Transport policy can have a wide variety of aims. It may be to seek to change or preserve various elements of the transport systems, transport related behaviours and activities, or transport governing markets, institutions, and organisations. The purpose of such changes can again refer to a broad range of economic, social and/or environmental objectives.

To obtain such aims and objectives a large variety of policy instruments and measures can be adopted. It is necessary to consider the types of policy measures and their effects in the context of the policy aims, and the mechanisms that allow the measures to become adapted to fulfil them. It is in the interplay between policy aims, available instruments and real implementation processes that the consequences – desired, as well as possibly undesired ones – of policy measures occur.

Chapter 2 therefore starts by providing an overview of European transport policy making processes and goals. A range of recent key transport policy documents are reviewed. Also

key features of national transport policies in seven EU Member States are briefly described and compared.

A main element in the chapter is an inventory of transport policy measures. It is not intended as a complete overview of every policy measure, but provides a rich source of examples of different approaches, possible unintended effects and adoption barriers. A full list of the considered measures is included in Annex 1 to this deliverable.

Chapter 3 has its focus on the topic of unintended, or as it will be defined, *significant counter- and other non-intentional consequences* which may or do arise directly or indirectly through political interventions in the transport sector. Already in chapter 2 some examples are given on such effects in connection with a variety of policy measures. A key element in chapter 3 is therefore to establish a more systematic understanding of non-intentional effects, by working through a series of concepts and dimensions associated with this problem, as reported in scientific literature and transport research. This leads to a series of definitions and a set of categorisations of non-intentional effects, that is a *typology*. The idea is that such a typology can be helpful to distinguish between different problems and approaches which can be taken with regard to each type of non-intentional effect when a policy packaging framework (chapter 4) is applied.

The main function of the typology in chapter 3 is to provide input to the Framework for Policy Packaging that is laid out on chapter 4. The aim of the framework is to establish a systematic approach to policy packaging that may serve as a guideline (rather than a prescription) for combining policy measures into policy packages. The rationale for policy packaging is established and a definition of 'policy packaging' for the purposes of OPTIC is provided.

Chapter 5 provides an overall summary of the Deliverable.

Chapter 2, 3 and 4 each have an accompanying appendix that can be found at the end of the deliverable.

The final appendix, 7.4, provides a detailed discussion of an expert workshop held in April 2010 designed to test the policy packaging framework outlined in chapter 4.

2 European transport policy and policy analysis, tools and measures

This chapter is comprised of three distinct sections, and also provides the basis for further discussion later in the deliverable of unintended effects of transport policies (Chapter 3) and a framework for policy packaging (Chapter 4).

First, Section 2.1 gives a general description of the process of European policy making, including an overview of some main bodies involved in transport policy formulation and the most relevant instruments in use.

Second, in Section 2.2, a brief review is made of European transport policy together with a comparison of some national transport policy approaches and objectives. Of special interest are the stated main problems related to transport, the goals for the EU transport policy and approaches to achieve these goals. Since transport is, in general, a derived demand many policy areas will have some impact on the transport sector. Therefore we will also examine some more overarching EU policy documents.

Third, Section 2.3 provides an overview of the inventory of transport policy measures and it shows how the inventory can be used to identify and analyse policy measures representing a wide range of different objectives, measure types, modes, geographical scales and locations. This section also uses data from the inventory to highlight issues related to unintended effects of transport policy measures, barriers to implementation and other dimensions of policy making.

2.1 The process of EU policy making and tools available for policy making

The institutional procedures shaping EU policy have been subject to considerable change since its inception. For instance, the European Parliament (EP) has gone from only having a marginal role in the policy process to possessing considerable power as the result of various treaties. The institutional design has also been an area of extensive debate by scholars and politicians. Democratic deficit and the relative power of the EP are just two examples of subjects which have been widely discussed (see, for example, Eriksen and Fossum, 2000; Crombez, 2000; König and Pöter, 2001; Tsebelis and Garrett, 2000). There is no 'single' process or pattern of EU policy-making (Wallace, 2005). Indeed, the formal rules of decision-making depend on the various policy domains. Thus, whether the Council of the European Union votes through qualified majority voting or unanimity is connected to the issues involved. The European transport policy especially reflects this high need for consensus (Heritier *et al*., 2001).

There are various tools available for EU policy making. First, regulations, directives and decisions are essential in this process. Directives give some flexibility to member states in implementation; laws on technological standards especially affect transport policy directly. There has also been a long term goal of completion of the common market. A free market sector in transport has been regarded as a central element in this process and several directives and regulations have been passed in order to promote the competitive conditions within the transport sector. Still, compliance with EU laws, at national levels, is far from complete—thus hindering the success of the policies implemented. What is called the "transposition deficit" has risen. The main problems are that transpositions are late, incomplete and incorrect (Groenleer *et al*., 2008). The lack of coordinated development in national transport systems has also been one of several obstructions. Further, a combination

of international rules produced by international organisations and (protectionist) national laws makes it difficult to regulate transport. Thus, the EU characteristic of having both intergovernmental and supranational elements makes it challenging to implement a common market in the transport sector. Particularly, the principle of subsidiarity constrains the tools possible for EU policy-making in transport.

Second, the EU uses guidelines, research and financing of transport infrastructure projects to influence transport policy (Janic and Reggiani, 2001). There might be a connection with EU powers in different issues and the use of guidelines. Many of the aspects of transport policy come under the national governments. Measures, like urban and land-use planning policy, urban transport policy and social and education policy take place at the local and national level. The use of guidelines might be preferable in such areas. Especially Article 155 of the EC treaty established a number of guidelines with regards to trans- European network.

In addition, EU has initiated numerous research programs in the field of transport. Research is an important factor in order to have an effective and a high-quality policy. The most important tools are the Framework programmes. At present, the 7th Framework programme (FP7) for Research and Technical Development covers the period 2001-2013. All inputs from the FPs are processed by the relevant Directorate – General (DG) -for example the one for Research, and the newly created Directorate – General for Mobility and Transport.

An important role in drafting legislation is played by the European Parliament, which is the only directly elected body of the European Union. The European Parliament is working in several committees and one of them is the Committee on Transport and Tourism (TRAN). The TRAN Committee is responsible for matters relating to the development of a common policy for road, railways, inland waterway, maritime and air transport, postal services and tourism. TRAN is particularly active in areas of common rules applicable to transport within the EU, establishment and development of trans-European network, the provision of transport services, transport safety and relations with international transport bodies and organisations. The TRAN Committee is supported in its legislative work by independent expert advice. Investments are also a crucial policy tool. The European Investment Bank and the Regional Development Fund have been the main institutions for financing infrastructure. Railways have traditionally been prioritised, but significant investments have also been put into roads, airports and waterways.

A final point to note here is that EU policy making has both direct and indirect effects on European transport policy. There are numerous guidelines and directives which have an indirect effect on transport. Both environmental and regional policies serve as examples. However, the important point is that the nature of EU policy-making processes strongly depends on the nature of overlapping policy domains.

2.2 European transport policy – review of current approach and goals

The main aim of this section is to provide a background for the rest of Chapter 2 and for the OPTIC project in general. Three kinds of policies will be described in the following sections: overarching EU-policies; transport specific EU-policies; and national policies. Main focus will, however, be on the more general EU transport policies as outlined in the 2001 White Paper, the 2006 Mid-term Review and the current discussions on the Future of Transport. Finally issues related to transport policies, goals and approaches are discussed with respect to two questions: has European transport policy changed during the last decade? And, have the policies been effective in achieving the goals?

2.2.1 Overarching EU strategies, policies and goals affecting transport

In this section we will briefly describe some of the most important overarching EU-policies that have bearings on the transport sector. The overall goals for the Union are laid down in the Treaty on European Union. Several of these have relevance for transport. Obviously, a well functioning transport system is crucial for achieving a single market for goods in Europe and a European industry that is competitive on global markets. Transport also constitutes one of several means necessary for promoting social cohesion and level opportunities for people in all parts of the union. And although transport in general is a derived demand, the transport industry as such is an important part of the European economy, since it accounts for about 7% of GDP and over 5% of total employment in the EU.

The EU work on a Sustainable Development Strategy (SDS) has had a significant impact on transport. In 2006 the European Council adopted a new Sustainable development strategy that built on the Gothenburg strategy of 2001 (Council of the European Union, 2006). This was followed up in 2009 by a further renewed strategy in which it was said that "The SDS constitutes a long term vision and an overarching policy framework providing guidance for all EU policies and strategies and including a global dimension, with a time frame of up to 2050" (Council of the European Union, 2009, p.2). In the 2006 SDS seven key areas are identified with regard to challenges and operational objectives and targets. Two of these areas are in particular transport related (1) Climate Change and Clean Energy and (2) Sustainable Transport. Some relevant objectives and targets mentioned for the former were:

- EU-15 target of reducing total greenhouse gas emissions by 8% between 1990 and the period 2008-2012.
- By 2010 12% of energy consumption (increasing to 15% by 2015) and 21% of electricity consumption should be met by renewable sources.
- By 2010 5.75 % of transport fuel should consist of biofuels as an indicative target.
- An overall saving of 9% of final energy consumption should be accomplished by 2017 compared to 2008.

And for the latter:

- Decoupling economic growth and the demand for transport.
- Achieving a balanced shift towards environmentally friendly transport modes to bring about a sustainable transport and mobility system.
- The average new passenger car should achieve CO_2 emissions of 120g/km by 2012 (this target has since then been relaxed, see below (authors comment)).
- Halving road transport deaths by 2010 compared to 2000.

In the SDS of 2009, not much is added regarding concrete targets related to transport. Instead, reference is made to the forthcoming White paper in 2010. In December 2008, the 'climate and energy package' was agreed by the European Parliament and Council. It included targets to cut greenhouse gas emissions by 20%, to increase share of renewable energy to 20% and to improve energy efficiency by 20%, until 2020. The package also included new conditions for the EU emission trading system, a framework for carbon capture and storage and a long term target for emissions from new cars of 95 g CO_2/km by 2020.

In outlining a future strategy for the EU, the Commission has launched a working document; *Consultation on the future 'EU 2020' strategy* (CEC, 2009a). It is mentioned that a rethink of transport policy is necessary. Key elements that are mentioned are better integration of networks, developing alternatives to road transport, promoting clean technologies and upgrading infrastructure.

2.2.2 Review of EU transport approaches, policies and goals

European Transport Policy (ETP) has been presented in the White paper: *European transport policy for 2010: Time to decide* (CEC, 2001) and in the Mid-term review of that paper (CEC, 2006). At present there is a process going on that should result in a new White paper on transport in 2010. One part in this process is the communication from the commission, *A sustainable future for transport: Towards an integrated, technology led and user friendly system* (CEC, 2009b).

There are basically two kinds of goals for European transport policy. The first kind relates to the primary function of transport, i.e. to provide a high level of mobility for both passengers and goods which in turn is stated as vital to "...achieving the free flow of people, goods and services, to improving social and economic cohesion, and to ensuring the competitiveness of the European industry." (CEC, 2006)

The second kind relates to the negative (external) effects generated by transport, which should be minimised. The negative effects most often focused are climate change, local pollution, noise pollution, accidents and energy insecurity (CEC, 2008 b). Congestion is often mentioned together with these externalities, but is actually closer related to the functional goal of achieving a high mobility. It might be seen as a kind of rebound effect of the increasing mobility.

The transport policy papers often focus on approaches to fulfil these targets. These approaches might contain required physical changes to the transport system, like shifting transport to rail, as well as general policy strategies such as pricing optimisation. The basis of the 2001 White paper is the intended decoupling of economic growth and transport growth. Four key approaches were proposed:

1. Shifting the balance between the modes of transport
2. Eliminating bottlenecks
3. Placing users at the heart of transport policy
4. Managing the globalisation of transport

In the Mid-term Review of 2006 the objectives of EU transport policy are retained from the White paper of 2001 and should help provide Europeans with efficient, effective transportation systems that:

- 'offer a high level of **mobility** to people and businesses throughout the Union'
- '**protect** the environment, ensure energy security, promote minimum labour standards for the sector and protect the passenger and the citizen'
- '**innovate** in support of the first two aims of mobility and protection by increasing the efficiency and sustainability of the growing transport sector'
- '**connect internationally**, projecting the Union's policies to reinforce sustainability, projection and innovation'

Although the Mid-term review continues in roughly the same direction as the White paper of 2001, there is some slight shift of focus. Modal shift seems to be given slightly less emphasis, for example. At the same time, efficiency improvements within each mode are given more attention. Co-modality is also mentioned specifically in the Mid-term Review. It is concluded that the measures suggested in the White paper will not be sufficient on their own to achieve the EU transport objectives. The tension between achieving the environmental targets and at the same time facilitating mobility is mentioned specifically. Further, a comprehensive, holistic approach to transport policy and 'a broader, more flexible transport policy toolbox' is called for. The less-than-ideal functioning of intra-EU maritime and rail transport is identified as a significant problem.

A key challenge for urban transport is identified as “how to increase mobility while at the same time reducing congestion, accidents and pollution”. Urban planning is mentioned briefly along with several other policy areas: ‘transport and energy’, ‘optimising infrastructure’, ‘intelligent mobility’ and ‘the global dimension’. Due to transport becoming a high-technology industry the need for research and innovation is stressed. The increased budget of the European 7th Framework programme for Research and Development is therefore a key component in achieving the economic, social and environmental objectives. Furthermore it is mentioned in the Mid-term Review that both new infrastructure and demand management is needed.

The EU policy relating to the Trans-European transport network (TEN-T) has been an important tool for improving integration of the transport systems in Europe. The TEN-T Guidelines was adopted in 1996 and amended in 2004. They are intended to improve coordination in the planning of infrastructure projects by the Member States. Another important part of the TEN-T policy is the 30 ‘Priority (Infrastructure) Projects’ across the Union. In 2009 about one third of the projected investments amounting to 400 billion € in total had been made. Examples of completed projects are the Öresund link, Malpensa airport and the Betuwe rail freight line.

The communication *A Sustainable Future for Transport* (CEC, 2009b) constitutes part of the process which will lead to a new White paper on transport in the end of 2010. Seven broad policy objectives are proposed:

- Quality transport that is safe and secure
- A well-maintained and fully integrated network
- More environmentally sustainable transport
- Keeping the EU at the forefront of transport services and technologies
- Protecting and developing the human capital
- Smart prices as traffic signals
- Planning with an eye to transport: improving accessibility

The importance of taking the long term perspective in order to avoid lock-ins with regard to e.g. transport infrastructure is particularly stressed. It is concluded in the communication that many of the set up transport objectives have been achieved, but that the environment is an area where further improvements are necessary. This especially holds for emissions of greenhouse gases. A significant shift of perspective is evident in this document. While increased “mobility” was perceived as the key functional aim of the transport system in both the White paper of 2001 and the Mid-term Review, here “accessibility” is introduced. For instance it is said that transport is a means to satisfy “a rising demand for accessibility”. This shift also entails more focus on planning issues and in particular the effect that urban structures and the location of services has on the accessibility to services. It is concluded that “[t]he trend towards the concentration of activities has produced a large amount of “forced” mobility, owing to a worsening of accessibility conditions.” This new interest in accessibility also implies that a greater focus on IT-solutions is required: “[t]ransport needs can also be reduced by increasing “virtual” accessibility through information technology (teleworking, e-government, e-health etc).”

To alleviate congestion in the transport system and to promote intermodality, improved infrastructure capacity is put forward as a key area in *A Sustainable Future for Transport*. At the same time it is concluded that funding for new infrastructure will be hard to find. Therefore making better use of existing infrastructure through, for example, appropriate pricing for its use is an important task. Integration of different parts of the transport networks as well as interconnections between different modes is also emphasised.

Regarding quantitative targets one may distinguish between direct targets which refer directly to the impact category in question—for example, persons killed in traffic accidents or emissions of carbon dioxide—and indirect targets that refer to an impact category which has

more of an instrumental character with regard to the ultimate target. A number of direct targets are present in European transport policies; for example, that road transport deaths should be halved between 2000 and 2010. Indirect targets are more common. One example is the binding target for a minimum 10 % share for biofuels in transport by 2020 that has been passed (CEC, 2008 a) together with requirements for what kind of biofuels might be acceptable. These are set to reduce the use of fossil fuels in transport and, hence, corresponding emissions.

An important and quantitative indirect target is that of Regulation (EC) No 443/2009: *setting performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles* (EC, 2009). Actually this regulation both comprises a target and a policy instrument as it includes penalties for not complying with the target. It is stated that by 2015 the average emissions for new passenger cars in the EU should not exceed 130 g CO_2/km. There will be phase-in rules between 2012 and 2015 limiting the share of a manufacturers cars that shall be taken into account to 65% in 2012, 75% in 2013, 80% in 2014 and 100% from 2015 and onwards.

In 2008, it was decided that aviation should be integrated in the EU emission trading system from 2012 (Directive 2008/101/EC of the European Parliament and of the Council). The directive states that all flights arriving to or departing from an EU airport will be concerned. The carbon dioxide emissions will be included but not the emissions of the other greenhouse gases, nitrogen oxides and water vapour, that aviation emits. At first 85% of emission permits for aviation will be allocated free of charge while the remaining 15% will be auctioned.

2.2.3 Comparison of national transport policy approaches and objectives

Here we chart a brief comparison of national transport priorities and policies in the UK, Sweden, Denmark, Germany, the Czech Republic, Austria and Norway. In general, the structure of transport policy objectives is rather similar across the seven countries covered and, indeed, is strongly comparable to objectives at the EU-level. There is a functional objective connected to achieving mobility or access as well as a handful of objectives relating to negative externalities caused by transport. The functional objective is, however, expressed in slightly different ways between countries. In the UK it is expressed as "to support national economic competitiveness and growth"; in Norway that the transport system should cover the Norwegian society's transport requirements; and in Germany and Sweden that transport should be economically efficient.

In most cases there is not an explicit hierarchy between the objectives, but in practical policy decisions it seems that the functional target nearly always takes precedence – i.e., to build and improve infrastructure. One indicator of this is the fact that few environmental targets are achieved, which is apparent in many of the follow-up transport policy documents, for example the EU Mid-term Review. A more specific example is the Swedish target that carbon dioxide emissions from the transport sector should be reduced by 10% between 1990 and 2010. In 2008, when it was obvious that the target would not be met, it was simply removed.

The provision of adequate infrastructure is obviously a key concern for transport policy everywhere, although priorities in this field differ. For instance, in the Czech Republic high-speed rail construction will be speeded up; in Austria, the Brenner base tunnel will be given special priority; and in Denmark a great share of the budget will be spent on the fixed link across Fehmarn Belt (together with Germany) and the Metro Circle line in Copenhagen. High-speed rail investments have also recently been highly prioritised in, e.g. Spain. In Sweden the Government made a directive saying that the transport planning authorities should make infrastructure plans in which new roads accounted for at least 50% of the available budget for investments in transport infrastructure.

Sustainability and its ecological, social and economic dimensions are often mentioned in the objectives. In Germany it is expressed that “[m]obility today should not impede mobility of future generations”. That the transport sector must contribute in mitigating climate change is a high level policy objective in almost all countries. The social dimension is however given considerably less emphasis than the economic and environmental ones. However, ensuring the spatial equity of transport system is an objective at the EU-level. While it is mentioned in many cases, it is most pronounced in Norway and Sweden. .

As is the case at the EU-level, the functional targets are rarely quantified in national policies. Quantitative targets specific for the transport sector are common for traffic safety. In both Norway and Sweden it is stated that transport policy should be based on a vision of zero accidents with fatalities within the transport sector. This vision is complemented with more practical quantitative intermediate targets. Regarding greenhouse gas emissions they are rarer. Germany has a target to reduce transport related CO_2-emissions by 50% until the year 2030 compared to the year 1990. The German federal government has also approved a target of reducing passenger transport intensity by 20% and freight transport intensity by 5% until the year 2020, compared to the year 1990. Encouraging a shift to more energy efficient and environmentally benign transport modes is mentioned more explicitly as high level objectives in the Czech Republic, Germany and Denmark, although it is also mentioned in almost all countries in one way or another.

In the UK, the 1998 White Paper *A New Deal for Transport: better for everyone* had some interesting features in that it explicitly recognised the perceived fallacies of following a ´predict and provide´ approach to transport management. This new perspective, however, lost its influence a few years later. If looking at the contemporary national transport policies it seems like a traditional ‘predict and provide’ approach is still rather influential, even if a dissonance might be distinguished. If not so much in practice, policy documents sometimes highlight the importance of measures designed to decrease the demand for transport. Another objective, used in the UK and in Sweden, which may have similar effects, is that transport policy should promote transport modes that are beneficial to health.

2.2.4 Development of European transport policy and its successfulness

There have been no radical changes in EU transport policy from the White paper 2001 to the current date. One noteworthy aspect, however, is the shift in emphasis from increased mobility to increased accessibility that appeared in *A Sustainable Future for Transport* (2009). This acknowledgment that transport is generally a derived demand opens up consideration for other means of improving accessibility, such as urban planning and virtual accessibility.

Another subtle shift is that, while building new infrastructure is still important, the efficient use of existing infrastructure has received an increasing attention. Improved technical possibilities brought about by the rapid development in the IT-sector as well as successful large scale introduction of congestion charging have been key catalysts for this policy change.

As discussed previously, we can think of types of goals for European transport policy. The first relate to the primary function of transport, i.e. to provide a high level of mobility (and accessibility) for both passengers and goods and the second kind relates to the negative (external) effects generated by transport, which should be minimised. The first kind of goal (functional) is seldom, if ever, quantified. The transport policy should achieve a “high” level of mobility or a “free” flow of goods, but these notions are not specified further. The second kind of goal, on the other hand, includes some that are quantitative. It is often difficult to measure whether the policies have been successful in achieving the goals. The main reason being that most goals are qualitative in nature, and rather vaguely formulated. It is also the case that target fulfilment depends on the total policy landscape – including global

agreements, EU-policies, national and local policies – as well as contextual elements, like for instance oil prices.

In *A Sustainable Future for Transport* (CEC, 2009) it is stated that the environment is the policy area where further improvements are most needed. Some of the quantitative goals are indicative and some are binding. There is an indicative target that 5.75% of transport fuel used in the EU should consist of biofuels by 2010. This target is not expected to be met. A new target for the share of biofuels was adopted in 2008, which implies that a 10 % share for biofuels should be accomplished by 2020. There is a target for average carbon dioxide emissions of new cars which should by 2015 not exceed 130 g/km. There is a phase-in period between 2012 and 2015. In 2007 the average emissions of new passenger cars sold in the EU was 158 g/km.

The EU has adopted an overall emission reduction target for greenhouse gas emissions of 20 % between 1990 and 2020. If other developed countries commit themselves to similar reductions the EU will move to a 30 % reduction. For the sectors outside the EU Emission Trading System (ETS), a reduction of 10 % between 2005 and 2020 is proposed. It is not specified how much respective sectors should contribute to reach these targets, but it is hardly possible to reach such targets without substantial efforts to limit transport emissions compared to the present business-as-usual forecasts. To illustrate the scale of this challenge, greenhouse gas emissions from transport in the EU increased by 28 % between 1990 and 2006.

In regard to road safety, transport deaths should be halved by 2010 compared to 2000. This goal is not projected to be met, although a quite substantial reduction of about 40% is projected.

The decoupling of economic growth from transport volume may be regarded as a semi-quantitative goal. It is rather easy to measure how much decoupling actually occurs, but the goal only says that it should be achieved, not to what extent. A goal of the same type is '[a]chieving a balanced shift towards environmentally friendly transport modes'. It is far from clear what defines a balanced shift and what has been achieved, or not, in this respect.

A factor hindering efficient goal achievements is that a level playing field with regard to the taxes that different means of transport pay, still seems far away. No carbon tax (or tax whatsoever) is levied on air and sea fuel. Furthermore, and as important, international air fares are still exempt from VAT. In 2012, aviation will be included in the EU emission trading system, but according to predictions the price of the emission permits will only amount to a fraction of what road transport pays for its emissions. As noted, only carbon dioxide from aviation is included, water vapour and nitrogen oxides emitted from aircraft together has almost as big climate impact as the carbon dioxide, but they are not included in the ETS (Lee *et al*., 2009).

The Mid-term Review (CEC, 2006) acknowledges the inherent tension between achieving the environmental targets and at the same time facilitating mobility as a means for economic growth. If it turns out that, as voiced by some experts, improvements in vehicle energy efficiency and increase in use of carbon neutral fuels are not sufficient in order to reach the climate targets, this conflict may increase. In some cases relations between goals is dependent on what approaches/policies that are used. For instance, reduced speeds as a means to improve traffic safety will also, in general, yield lower emissions. On the other hand, using heavier cars as a means to improve safety will increase emissions.

It can be argued that the EU has a clear transport policy, and this policy is not stagnant but evolving over time. At the same time, it is clear that because most of the policy objectives are defined in a normative way, i.e. the need for sustainable transport, makes it hard, or even impossible, to formulate specific policies that will facilitate the delivery of the policy objectives. Furthermore, this normative definition of objectives does not allow a transparent and unambiguous prioritisation of objectives when, as often is the case, some are conflicting

each other. Nevertheless, transport policy makers within the EU working at different geographical and institutional levels have a reference point which aims to describe what transport policy should strive to achieve.

2.3 Inventory of policy measures

This section documents the project's efforts to establish an 'inventory' of policy measures. The inventory is reproduced in Appendix 1 to this Deliverable. The purpose of the inventory is partly to be a source for illustrations of situations, effects and approaches, and partly to serve as a database from which the OPTIC project can access information for forthcoming research tasks.

It is not intended to assemble a complete inventory of every policy measure available within the EU, but rather to provide an overview of the different types of measures available for policy makers and allow for a closer examination of their nature. However, with respect to a specific policy objective, some extensive inventories of measures are available. For example, the VIBAT project (Hickman *et al*., 2009) examined the potential for CO_2 emission reductions from transport by identifying about 150 individual policy interventions to reduce transport CO_2 emissions. The Handbook of road safety measures (Elvik *et al*., 2009), too, contains 128 unique measures.

Building on the previous section, our approach will be 'objectives-led', and we use the inventory to highlight policy measures that are designed to meet different policy goals, according to some further categorisations. A total of 79 examples of measures from around Europe have been gathered and described in order to illustrate the scope and scale that such measures can constitute (for full details see Appendix 1). This chapter therefore relies on, and briefly summarises, the findings from this exercise. This is carried out through an examination of empirical evidence of measures and the introduction of additional measures, introduced at different institutional levels, their successfulness and the occurrence of obstacles, barriers and unintended effects.

2.3.1 From objectives to measures

It is widely recognised that there is a need for government intervention in order to attain policy objectives related to the transport sector. And there have been considerable attempts, within both the academic community and amongst practitioners and institutions at all levels, to reach specific targets and to seek and analyse appropriate measures to meet transport policy objectives. Here, we will be looking at the ways in which different *policy measures* can be applied in order to meet such objectives. Transport is generally associated with derived demand. As such, there are continual interactions between the "transport system" and the rest of the economy and society. While different approaches have been adopted in the definition of the transport system (see for example Manheim, 1979; Cascetta, 2009), our definition embraces all the interacting elements that are organised to produce the stated purpose of the transport system, i.e., accessibility and the movement of people and goods. Hence the interacting elements include the supply as well as the demand side, along with the producers and the institutions directly involved with the functioning of transport.

The interactions of the transport system with the rest of the economy and society suggest that any change in the rest of the economy and society will affect transport and vice versa. And external factors such as changes in world market prices will have consequences for both the transport system and the rest of the economy and society. Any change in the transport system will manifest itself through the changes in its outputs associated with both supply and demand and its institutions. We refer to these changes as effects. Examples of effects are changes in traffic volumes by mode, changes in infrastructure, changes in land

use and logistics, etc. These effects can in turn be translated into environmental, economical and social impacts.

The figure below presents a system perspective of the interactions of the transport systems with other sectors of the economy and traces the relation between overall policy objectives and transport specific policy objectives, their effects and impacts through the transport system. The intention is to provide an overview of the mechanism through which the transport-specific policy objectives and measures are formulated and the way the implementation of these policy measures can bring about desired results or unintended effects.

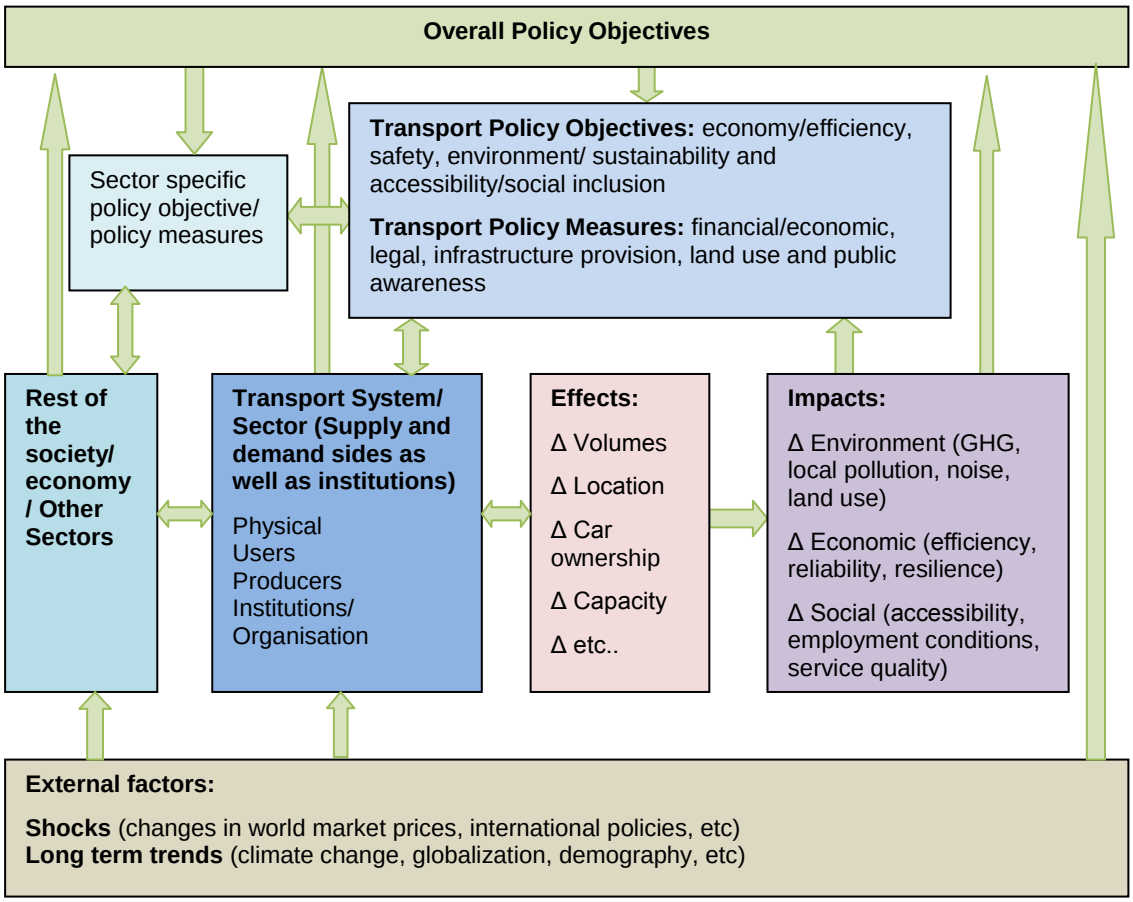

Figure 2.1: A system perspective on the interrelations between overall policy objectives, transport policy objectives and measures, direct transport related effects, and final impacts.

2.3.2 Categorisation and characteristics of measures

Figure 2.2 provides an overview of the basis for the categorisation of dimensions and attributes of the selected examples that are given in the inventory of measures. While the full inventory of measures is included in appendix 1 to this Deliverable, this section provides a summary of the main aspects and findings.

Primarily, the inventory is structured according to four main dimensions:

- Policy objective (4 broad categories: accessibility/social inclusion, economy/efficiency, environment/sustainability and safety)
- Policy measure (5 broad categories: legal, financial/economic, infrastructure, land-use and public awareness)
- Geographical scale (3 levels: EU, national, regional/local)
- Mode (6 broad categories: walk/bicycle, road (private transport), road (public transport), rail, maritime, intermodal)

The collection of examples are organised to represent all possible combinations of these dimensions. Further, where relevant, the inventory includes the following attributes, which are further described in the next section:

- Barriers (7 broad categories: cultural, institutional, fiscal/financial, legal/regulatory, knowledge/information, political or technical, and further 3 broad categories: implementation stage, adoption stage and both)
- Case study location
- Specific goals
- Unintended effects (3 broad categories: positive, negative, both positive and negative)
- Complementary/remedial measures
- Goal achievement

The inventory of policy measures largely follows and is constructed around the main objective categories, and these can be either primary or secondary policy objectives. There is, furthermore, a broad selection of policy instruments and measures available for meeting one or several of these objectives. In the PROSPECTS project (5th Framework Programme) a number of possible measure categorisations were discussed according to their relevance for urban transport policies, resulting in seven measure categories. Building on this approach, we reduce the number of categories to five broadly defined policy measures as stated above.

The inventory indicates the geographical scale at which these measures have been implemented. For our purposes, we define three levels: EU, national and regional/local. It is, however, as noted in Section 2.1 not uncommon that whereas policy objectives are formulated at one administrative level, the tools to implement or regulate it are available at another administrative level.

The gathering of cases to the inventory is done in order to represent many potential combinations of policy objectives and policy measures available to address these objectives. Figure 2.2 below illustrates the possible links between these two dimensions and illustrates how the data in the inventory can be used. One specific combination of objective and measure is also highlighted, and it is shown in the following table how examples of this combination can be extracted from the inventory.

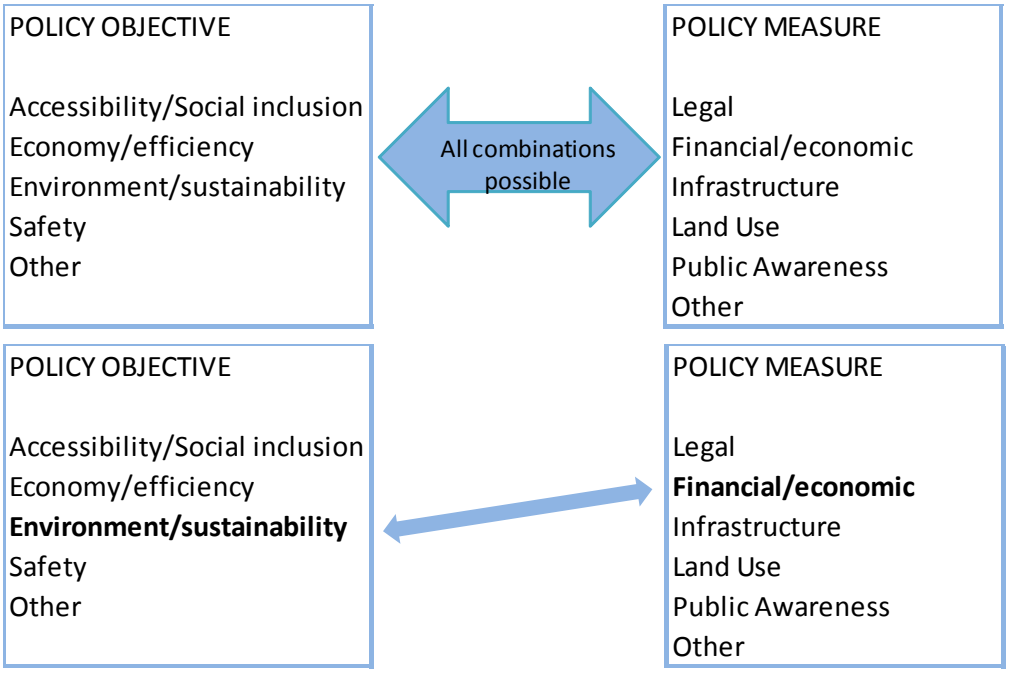

Figure 2.2: Possible combinations of policy objectives and policy measures (top) and an illustration of one combination (bottom).

A combination of environmental/sustainability objectives and financial/economic measures can take various forms in practice. The Table 2.1 below lists selected examples from the inventory (for the full information provided on each measure see Appendix 1).

Table 2.1: Examples from the inventory of policy measures of combination of environment/ sustainability objectives and financial/economic measures.

Measure (Short name)	**SCALE**	**POLICY OBJECTIVE (Primary)**	**POLICY MEASURE**	**MODE (Primary)**	**CASE STUDY LOCATION (region/city)**	**Country**	**CASE STUDY CHARACTERISTICS (brief description)**
Fairway fees	National	Environment/sustainability	Financial/economic	Maritime	Swedish ports	Sweden	Fairway fees differentiated according to the emissions of sulphur and nitrogen oxides for the ships.
Aviation in the EU ETS	EU	Environment/sustainability	Financial/economic	Air	EU	EU-wide	Inclusion of aviation in the EU ETS by 2012
Environmentally differentiated landing fees	National	Environment/sustainability	Financial/economic	Air	Swedish and German airports	Sweden	Landing fees differentiated according to emissions of Nox and HC
CO2-differentiation in motor vehicle taxation	National	Environment/sustainability	Financial/economic	Road (private transport)		Norway	Change in motor vehicle taxation structure towards heavier taxation on high CO2-emission vehicles
Alternative fuel policy	National	Environment/sustainability	Financial/economic	Road (private transport)		Norway	National policies for promotion of alternative fuel
Free public transport	Regional/local	Environment/sustainability	Financial/economic	Road (public transport)	Templin (Brandenburg)	Germany	Implementation of free public transport (busses) in Templin (Brandenburg)
Promotion of new low-emission and river-compatible inland waterway vessels	National	Environment/sustainability	Financial/economic	Maritime		Germany	Promoting the acquisition of new low-emission and river-compatible inland waterway vessels
Promotion of railway sidings	National	Environment/sustainability	Financial/economic	Rail		Germany	Promoting railway sidings Promoting the new construction and extension as well as the reactivation of private railway sidings
Promotion of handling installations for intermodal transport	National	Environment/sustainability	Financial/economic	Intermodal		Germany	Promoting handling installations for intermodal transport Promoting the construction, the extension and expansion of publicly accessible handling installations
Low Emission Zone	Regional/local	Environment/sustainability	Financial/economic	Road (private transport)	London	United Kingdom	Through road pricing, "the Low Emission Zone will reduce traffic pollution by deterring the most polluting diesel-engined lorries, buses, coaches, minibuses and large vans from driving within our city."

2.3.3 Unintended effects

A considerable number of the examples described in the inventory of measures have resulted in *unintended effects*. Importantly, these can be both positive and negative. In the table provided in Appendix 1, these are just briefly mentioned; however, it will be the subject of in-depth assessment in later phases of the OPTIC project. Furthermore, where applicable, the introduction of *complementary/remedial measures* is described in a separate column in the table. Depending on the circumstances for implementing these measures, they can form part of a policy package or represent individual measures triggered by a specific situation.

Unintended effects are reported in a majority of the examples in the inventory. Table 2.2 gives some examples of policy measures that have produced negative unintended effects.

As noted, unintended effects need not necessarily only be negative. The measures chosen may also result in positive effects which can benefit other sectors or users, and contribute, unintentionally, towards achievements of specific objectives. Table 2.3 illustrates this.

In certain cases, both negative and positive unintended effects appear as a result of policy measures taken. Table 2.4 gives some examples of this.

Table 2.2: Examples from the inventory of policy measures with negative unintended effects.

Measure (Short name)	**POLICY OBJECTIVE (Primary)**	**POLICY MEASURE**	**UNINTENDED EFFECTS (impact type and description)**		**GOAL ACHIEVEMENT (primary/secondary)**	**GOAL ACHIEVEMENT (specific)**
Subsidised ferry traffic	Accessibility/Social inclusion	Financial/economic	Negative	High emissions of CO2 from fast ferries	Yes	
Subsidised air traffic to sparsely populated areas	Accessibility/Social inclusion	Financial/economic	Negative	Increases emissions from air traffic	Yes	
Mainland connection	Accessibility/Social inclusion	Infrastructure	Negative	Regional desintegration (due to division of established public transport and freight routes)	Improved accessibility for eastbound and northbound traffic, while southbound traffic still dependent on ferry.	
CO2-differentiation in motor vehicle taxation	Environment/sustainability	Financial/economic	Negative	Shifting from gasoline to more diesel cars results in more local emissions (Nox and PM10)	Average CO2-emission from new cars reduced to 151 g/km in 2009	Change in vehicle fleet towards more diesel engines
Low-emission zone	Environment/sustainability	Legal	Negative	Evasion traffic Social exclusion (arising costs due to the technical refitting of vehicles)	Cleaner air in city centres	Reduction of fine particulates / particulate matter (ca. 10%)
Park & Ride	Accessibility/Social inclusion	Infrastructure	Negative	Promoting urban sprawl Deteriorating public transport in the urban hinterland, by discouraging the usage of feeder services	Success differs from case study to case study	Attracting passengers for public transport
Vehicle Scrappage Scheme	Economy/efficiency	Financial/economic	Negative	lock-in of predominant mobility habits; acts as a disincentive for choosing alternative modes	Effective: significant increase in consumer demand, hence sales revenue generated	
Park & Ride	Economy/efficiency	Infrastructure	Negative	Total car-km travelled (i.e. Including rural trips) actually increased as a result of the scheme. Also Prevention of pedestrians and cyclists using similar schemes has equity implications and may also have a negative influence on the attractiveness of 'active' modes	goals achieved only in the urban core. Rural areas exhbit induced demand for private car usage	Traffic volume in urban core was reduced and valuable urban land conserved for more productive purposes that car parking
Fare and schedule coordination	Economy/efficiency	Financial/economic	Negative	restricted competition on the transport market	All main goals are being progressively achieved; the establishment of the integrated system is not fully accomplished	There is a satisfaction with the system both on political and user level
Road pricing	Economy/efficiency	Financial/economic	Negative	Lorries have started to use low class roads	Other goals than to gain finance are not mentioned. Environmental impacts have not been investigated.	Success of the system is evaluated by the amount of collected money, which is relatively high
The reward scheme for improved public transport and reduced use of car in cities.	Accessibility/Social inclusion	Financial/economic	Negative	Only to a limited extent, the cities have applied restrictive measures for car transport.	In two of the cities, public transport has increased more than car transport, and the reward scheme is one among more causes.	N/A

Table 2.3: Examples from the inventory of policy measures with positive unintended effects.

Measure (Short name)	**POLICY OBJECTIVE (Primary)**	**POLICY MEASURE**	**UNINTENDED EFFECTS (impact type and description)**		**GOAL ACHIEVEMENT (primary/secondary)**	**GOAL ACHIEVEMENT (specific)**
Car pooling for businesses and households	Environment/sustainability	Other	Positive	Improved health and household economy	N/A	N/A
Digital tachograph	Safety	Legal	Positive	Preventing unfair competition from companies Providing valuable data to the haulage company, using it as an effective fleet management tool	A slight decrease in the number of offences	Better enforcement and higher compliance Reducing fraud possibilities (less tampering)
River Information Services (RIS)	Economy/efficiency	Other	Positive	Development of Public Private Partnership (PPP)	Shift of road traffic to waterborne transport Reduction in fuel consumption	Considerable increase in efficiency, reliability and safety of inland waterway transport
Promotion of new low-emission and river-compatible inland waterway vessels	Environment/sustainability	Financial/economic	Positive	Avoiding possible ban on driving due to the exceeding of EU air quality limits, thereby reducing economic risks for the operating companies	Reduction of environmental pollution	Fuel savings Decrease in pollutant emissions
Promotion of railway sidings	Environment/sustainability	Financial/economic	Positive	Modernisation of rail freight transport	Significant growth of rail freight transport Attraction of new customers	Shifting 1.5 milliard tonne-kilometres per year from road to rail
Integrative public transport tariff	Accessibility/Social inclusion	Public Awareness	Positive	Optimal orientation for the costumers	Providing and promoting mobility Harmonisation More standardised and easier / easier to understand tariff regulations	Significant decrease in prices for journeys across transport association boundaries Significant increase in numbers of passengers
Bicycle permeability	Accessibility/Social inclusion	Infrastructure	Positive	Success resulted in transfer of principles to other areas of London	[Brief description]	Moderately successful - rates of cycling in Hackney are amongst the highest in London.
Public transport management system	Accessibility/Social inclusion	Infrastructure	Positive	The exact data on public transport operation allow to declare that most of complains on nonobservance of public transport timetable are unsubstantiated ones	Public transport management in Brno Transport company is an unique tool, which supports significantly primary(secondary goals achievement, but no data are available	Public transport management system contributes positively to the usage of public transport services
Biofuels	Environment/sustainability	Other	Positive	less soy-bean feed imports are required, since high-protein animal feed is generated as a by-product of bioethanol and biodiesel production in Austria	in 2007 the 2.95% substitution target was reached and substantially exceeded at 4.23%	N/A

Table 2.4: Examples from the inventory of policy measures with both positive and negative unintended effects.

Measure (Short name)	**POLICY OBJECTIVE (Primary)**	**POLICY MEASURE**	**UNINTENDED EFFECTS (impact type and description)**		**GOAL ACHIEVEMENT (primary/secondary)**	**GOAL ACHIEVEMENT (specific)**
Liberalisation of air transport	Economy/efficiency	Legal	Both	Traffic leakages from regional airports to nearby main airports due to better frequencies/lower airfare, thus undermining the rational for subsidising regional routes.	Primary: Competition on main airports Secondary: No competition for tenders on regional routesdu to few bidders	Lower air fare on main airport where competition is present
Competitive tendering	Economy/efficiency	Financial/economic	Both	More coordinated network and less fragmented policy area, but competitive tendering put pressure on workers right and established labour relations	Initial reduction in costs, more coordinated route network	Cost reductions of 10% on average
Truck toll	Economy/efficiency	Financial/economic	Both	Evasion traffic Due to the higher density of controls, increase in traffic safety	Generated revenue: presumably 4.6 milliard Euro (2009)	Modal shift towards rail Higher capacity utilisation of trucks Decrease in the share of the lower EURO emission vehicles
Free public transport	Environment/sustainability	Financial/economic	Both	Induced public transport Improved accessibility / social inclusion	Municipal benefits: Decreasing marketing and operating costs of public transport Decreasing external costs of transport Decreasing investment needs for infrastructure	A slight decrease in private transport A significant and lasting increase in numbers of passengers (a six-fold increase within the first year)
English bus concession	Accessibility/Social inclusion	Financial/economic	Both	Bus travel increased amongst elderly, but unanticipated financial burden on local authorities	Relatively successful	(brief description if applicable)
Truck toll	Economy/efficiency	Financial/economic	Both	neg.: spatially limited evasion traffic to the low level roads, pos.: slightly positive effect on modal split (to rail cargo)	increasing revenues for road operator, increasing transport efficiency by less unloaded vehicles (deadhead) and higher payload	N/A

2.3.4 Additional and complementary measures

It is a repeating experience that after a policy measure is introduced it turns out to not be sufficient for meeting the formulated goal or objective. In certain cases, remedial or complementary measures are then added to enhance the policy effectiveness. In about half of the cases in the inventory of measures, additional measures have been introduced in some form. The table below provides some examples of this.

Table 2.5: Examples from the inventory of policy measures of the introduction of additional/complementary measures.

Measure (Short name)	**POLICY OBJECTIVE (Primary)**	**POLICY MEASURE**	**COMPLEMENTARY/REMEDIAL MEASURES (if applicable)**	**GOAL ACHIEVEMENT (primary/secondary)**	**GOAL ACHIEVEMENT (specific)**
Congestion charging	Accessibility/Social inclusion	Financial/economic	Improved bus traffic approx 6 months before CC was introduced	Yes	Traffic was reduced by 20-25% on links into central Stockholm
Liberalisation of air transport	Economy/efficiency	Legal	defined level of service and maximum air fare in the concession contracts for regional routes	Primary: Competition on main airports Secondary: No competition for tenders on regional routesdu to few bidders	Lower air fare on main airport where competition is present
Competitive tendering	Economy/efficiency	Financial/economic	Introduction of compulsory take over of employees	Initial reduction in costs, more coordinated route network	Cost reductions of 10% on average
Low-emission zone	Environment/sustainability	Legal	Extension of the low-emission zones Subsidies for the technical refitting of vehicles	Cleaner air in city centres	Reduction of fine particulates / particulate matter (ca. 10%)
Free public transport	Environment/sustainability	Financial/economic	Adjustment and / or extension of the public transport supply side	Municipal benefits: Decreasing marketing and operating costs of public transport Decreasing external costs of transport Decreasing investment needs for infrastructure	A slight decrease in private transport A significant and lasting increase in numbers of passengers (a six-fold increase within the first year)
Traffic circulation plan	Environment/sustainability	Land Use	Strong car parking enforcement widespread	primary	very successful
Channel Navigation Information Service (CNIS)	Safety	Infrastructure	Search and Rescue; close cooperation with French authorities	Appears highly successful in accident prevention; recent evaluation has taken place but not in the public domain.	(brief description if applicable)
Increased speed on motorways	Economy/efficiency	Legal	1) A period with increased speed enforcement on the motorways. 2) Increasing of the penalties for speed violations. 3) Considerable amounts of campaign activity. 4) Signposting at the 110-motorways	N/A	N/A
River Information Systems	Economy/efficiency	Infrastructure	Mandatory transponder requirement for vessels since July 1st, 2008 for a AIT (Automatic Identification System)	key tool in modernising Danube navigation, boosts traffic safety and improves the economic viability, reliability and planability of transport activities on the Danube.	N/A
Biofuels	Environment/sustainability	Other	Fuel standard limits proportion of biofuel to be blended to 5% by volume. Tax incentives for using biofuels	in 2007 the 2.95% substitution target was reached and substantially exceeded at 4.23%	N/A
parking space management	Economy/efficiency	Financial/economic	extending time for parking restiction in the evening, 50% increase the price for parking, SMS parking service	increasing revenue for Vienna municipiality, (no studies available about impact such as economic effect, shift to public transport, concerning impact on GHG emission and noise)	N/A

2.3.5 Barriers

Another aspect of policy measures that the inventory provides insight to is the existence of *barriers*. These can be perceived at both implementation and/or adoption stages. A few of the examples are of policy measures that have not been introduced due to barriers, and some may have been altered or adjusted in order to overcome these, thus affecting the extent to which objective have been met. Barrier categories are defined as following: cultural, institutional, fiscal/financial, legal/regulatory, knowledge/information, political or technical.

Barriers are reported to be present in approximately 70 percent of the examples in the Inventory. The reported barriers are spread evenly between the three categories: implementation stage, adoption stage and at both stages. The real and perceived existence of barriers does, however, vary in degree and manifestation and it is likely that what is registered in the inventory is to a certain extent a matter of subjective interpretation of obstacles met. It is, however, vital to recognise and be aware of potential barriers and, that unless certain measures are taken, these can result in the objective(s) not being met. It is often such barriers that necessitate the introduction of additional measures. in order to overcome their presence. Barriers are the main topic for Work Package 5 in the OPTIC project.

2.4 Conclusions

The EU, its member states as well as European regions and cities normally have defined (and documented) transport policy agendas. Such agendas and the objectives they set out to achieve seem to be relative similar in broad terms, but usually differ with respect to the targets and measures that are considered and selected to fulfil them. The different objectives might be in conflict. For example, in the EU, as mentioned both in the *Mid-term Review* and *A Sustainable Future for Transport* documents, there is a potential conflict between environmental objectives and mobility objectives.

It is clear that policy-makers, at all levels of policy-making have a range of measures at their disposal to use as the tools for making transport policy. Examples of these are described in Appendix 1. An overview of these measures reveals a few interesting patterns: unintended effects occur in the majority of examples, predominantly on the negative side, but there are also a few positive effects and examples where both negative and positive unintended consequences are reported.

- Complementary or remedial measures have been introduced in more than half of the examples, and would have probably been required in many more, if not all, of the examples described.
- However, in the inventory of measures there were no apparent links between the existence of barriers and the introduction of complementary measures.
- There appears to be no clear relationship between the type of measure introduced and the nature of corresponding attributes such as barriers, unintended effects and complementary/measures. In other words, it is not possible to conclude that a certain type of measures (e.g. legal) results in more or less barriers and/or unintended effects. Indeed, the presence of barriers seems to be almost universal across measures.

The complexities involved in meeting a single objective, let alone multiple objectives, even within the transport domain, strongly imply that single measures are rarely sufficient. Often, several measures may be needed. Furthermore, each individual measure, even if implemented in isolation from other measures is likely to face some form of barrier to its

implementation and/or its effectiveness and in addition might result in unintended effects, which, if negative, may require mitigation.

The limitations and unintended consequences of isolated transport policy measures have been illustrated by the fact that a large number of policies described in chapter 2.2 have been associated with limited success in achieving the goals set, and often exhibit adverse unintended effects. There is thus a clear need to better understand these effects in order to improve the extent to which individual measures contribute towards achieving a certain policy target. In developing a typology of non-intentional effects, chapter 3 provides the starting point for such a better understanding.

Barriers are reported to occur in a large majority of the examples in the inventory of policy measures. Barriers can take many different forms (political, technical, cultural etc) and to various degrees influence the potential goal achievement according to the selected measure(s). In cases when significant barriers are not overcome there will evidently be poor goal achievement. In other circumstances, the strain to reduce the barrier effect improves the understanding and effect of the actual process of selecting or adapting policy measure(s) and thereby improves goal achievement. The likeliness of meeting barriers at either adoption or implementation stages, or both, is a clear message that potential barriers need to be analysed and addressed before policy measures are introduced. A typology of barriers and good practices will be elaborated in WP 5 of the OPTIC project.

As shown in the many examples from the inventory of policy measure, the different policy measures have different attributes and their impacts are rarely observed or perceived in isolation from other policy measures or policy areas. Selecting adequate policy measure(s) implies the need to look at policies in combination, not necessarily because they should be introduced at the same time, but since there are interrelations between them. The case for policy packaging is also supported in the general literature. Hickman *et al*. (2009) and Hickman and Banister (2007) show how individual measures are unable to contribute significantly to CO_2 reductions, and how packages of measures are needed. However, they do not conclude as to how effects of two “mutually supporting” policies should be added up. They assume additivity, although (positive and negative) synergies seem more realistic, but difficult to forecast, and recommend more research to better understand such synergies.

In section 2.2 we identified complex sets of objectives at national and European levels. It is no exaggeration to state that many objectives are inherently conflicting, like increasing mobility while at the same time reducing transport externalities. This in particular holds for the imperative to rather soon make substantial cuts in carbon dioxide emissions. Single policy measures cannot address such multifaceted objectives and are doomed to be insufficient. In line with this, and even within one policy area, EEA (2009) recognises that environmental objectives are a complex matter which cannot be reduced to one single goal (e.g. reduce CO_2, or reduce noise). The limitation of isolated measures lies in the fact that there are more than one problem that need to be addressed, and hence the need for a package of policies. They argue strongly that in order “to achieve ancillary benefits, packages of mitigation measures need to be carefully designed” (p 9).

In total, the multifaceted and often conflicting objectives that relate to European transport, the complexity of individual policy areas, and indeed the inventory of policy measures suggest that packaging of policy measures is the most likely way to successfully address and solve the many challenges facing European transport. Packaging of policy measures can help locking in benefits, reducing adverse and rebound effects and secure higher levels of goal achievement.

3 Towards a typology of non-intentional effects

"If ever there was a society in which laws operated as anticipated by their makers, it is unknown to history." (Roots 2004, p 1390)

3.1 Introduction

Chapter 2 has exemplified a large set of policies and measures in the transport arena. In some cases various kinds of unintended effects have been indicated. The review illustrated that while unintended effects are, by their nature, often surprising, some of them can potentially be mitigated in advance, either by modifying policies, or by integrating them in complimentary packages. There is a clear need to develop a more systematic idea, or typology, of unintended effects, as a stepping stone towards a methodology for policy packaging, where unintended effects can be more systematically considered and potentially mitigated.

The purpose of OPTIC as such is not to establish a universally applicable taxonomy for all aspects of intentions and effects of transport policies. It is more to provide useful guidance to practice in order to anticipate and prepare for significant unintended effects by building packages of policies (see Chapter 4).

The guidance needs to be based in research. However, the research is equivocal on unintended effects of transport policies. It is therefore necessary to review a number of contributions and seek to highlight and overcome differences for the most important aspects of unintended effects to end up with a substantiated approach.

The purpose of the present typology is to,

- Develop clear *definitions* of 'unintended' (or 'non-intentional' as they will be labelled here) effects' of 'policies', and related terms,
- Provide a systematic and useful categorisation of *types* of such policy effects
- Enable *guidance* on how transport policies, transport policy packages and transport policy processes can be designed to consider ex ante, and if necessary, mitigate ex-post, these effects (the latter is dealt with in Work Package 3)

A brief look at related literature illustrates that there is not one single way to operationalise non-intentional effects and no one overarching logic that commands a certain approach. Therefore the approach and structure of the chapter does not right away establish and populate a rigorous typology, but moves towards it through a series of critical examinations and examples. Hence this chapter will:

- Briefly overview the sources of knowledge that inform this typology; specifically, key literature where non-intentional effects have been defined and/or analysed

- Outline the main concepts, dimensions and distinctions involved, provide definitions and delimitations for them one by one, and along the way include examples to illustrate ways to interpret and distinguish between, for example, different types of unintended effects

- Review some contributions to explain and point to why non-intentional effects may occur, referring to different scientific disciplines and literature

- Move towards an overall concept and structure as a first draft typology, which is to be improved and qualified along the OPTIC project

3.1.1 Sources of knowledge and research informing the typology

It can be assumed that most human actions are accompanied by un-intended consequences or effects. It is clear that political interventions as well as innovations are leading to unintended, adverse or unexpected effects especially in complex socio-technological systems such as transport (see Grunwald, 2002; 2008). Decisions relevant for future actions have to be taken, but the future is something unknown. Decision making always has to deal with a certain degree of uncertainty and risk (Bechmann, 2007). The decisions may not be leading to the effects that were intended, or may lead to effects that were not intended.

Policy effects that differ from directly intended ones have been studied by research in different scientific disciplines, as well as in more specific transport research work. 'Negative', 'adverse', 'unanticipated', 'unintended', and 'unwanted' consequences are commonly referred to, as are sometimes also 'uncomfortable' (Hallsworth et al., 1998), 'deceptive' (Flyvbjerg *et al*., 2002), 'perverse', (Albalate and Bel, 2008), 'paradoxical' (Knill and Lemkuhl, 1999), or even 'self-defeating' (Sunstein, 1997) effects.

Scientific disciplines contributing to uncover such effects include a wide field from natural sciences and engineering over to general philosophy of human cognition and rationality, to sociology, economics, political sciences and technology assessment, to mention some major ones. The former types of research (natural and technical sciences) can inform us about, for example, possible undesired environmental effects arising from interactions between physical components in the transport system. The social sciences may on the other hand help foresee or explain, for example, behavioural responses to policy interventions that may be neither obvious to, nor comfortable for, policy and decision makers.

In the transport area contributions to such knowledge come from research and practice in fields such as transport planning, policy analysis, assessment, economics, geography and psychology (Goodwin, 1998; Marshall and Banister, 2000; Feitelson, 2003; Flyvbjerg, 2009; Talvittie, 2006; Laird *et al*., 2005; Lindqvist, 1998 and many others).

Generally, research literature can contribute to the present work in two ways. First, it can provide concepts, distinctions and examples to help develop a general typology of what will generally we will term 'non-intentional' effects. This will be addressed in Sections 3.2 and 3.3. Second, research can be useful to identify and organise possible causes or explanatory mechanisms behind the various unintended effects. This is discussed in Appendix 7.2.

3.2 Main distinctions and definitions of unintended effects

This section will concentrate on how to define and clarify 'unwanted' or 'unintended' side-effects of transport policy measures; or what we more precisely will call: *significant counter- and other non-intentional consequences which may or do arise directly or indirectly through political interventions in the transport sector*; where 'counter-' refers to an opposite or modifying effect to what is intended, while 'non-' more generally means outside, but not necessarily 'counter' to the original intentions. These terms will be further discussed and defined below.

Other terms such as 'unanticipated', 'adverse', 'perverse' etc. are ones we consider as secondary to this overarching perspective; some of which will be given specific definitions, either as subcategories to the 'intentional/non-intentional' dichotomy or as categories in other dimensions.

3.2.1 'Policy'

The term 'policy' has many meanings and definitions. We adopt a rather straightforward view on policy as 'public policy' defined for example as a decision or a set of interrelated

decisions taken by political actors concerning goals and means of achieving them in a specified situation (see Jenkins 1978). We do not observe a strict distinction between 'policies, and notions such as 'plans', 'programmes', 'projects', etc, as this terminology differs across countries (DG TREN, 2005).

Policy might be understood in terms of both ideas and processes. Whereas policy ideas relate to the aims and goals of a certain decision, the term policy process implies that also the process of formulating and implementing the ideas in practice should be seen as part of the policy formation. It makes it clear that policy is, in essence, never static but under continuous development over time. It is a dynamic process, where the conditions for formation and implementation (in terms of actors involved, problem definitions, power relations etc) are changing continuously (Palm 2001, Hill 1997, c.f. Lipsky 1980).

In the context of OPTIC, this definition means that a policy might refer to a specific intervention, or program of interventions, but also formation of the (program of) intervention(s) and the process of practical implementation.

The key focus when we consider the effects of policies is nevertheless on the particular interventions that has its genesis as intended action ('goals and means') by political actors. These 'political actors' in connection with interventions and their intended effects are primarily the 'authorised decision makers'; meaning elected officials, and those civil servants they delegate policy making responsibilities to.

A policy objective is a specification of the policy intentions; a policy measure is the directed means or authorised action to achieve the objectives. An unintended effect of a policy decision can thus be defined broadly as "a consequence that diverges from an authorised or directed policy action." (Lindquist, 1998, p. 112).

Political actors do not operate in a vacuum, but are constantly engaged in relations with other actors, interests and institutions. The idea in this typology is to maintain a focus on the consequences of authorised policy intentions and actions, while of course recognising the socially embedded nature of these actions within wider governance structures.

3.2.2 'Intentions'

To begin with, non- and counter intentional effects are the core notions that need to be defined. Especially since the concept of *'intentions'* in science and public policy is sometimes controversial and nebulous. What are intentions? Whose intentions count? How are intentions observed? We provide the following answers.

We are taking, as our point of departure first of all core definitions provided by the Oxford English Dictionary (1989), whereby something is 'intended' or 'intentional' if it is "purposed to be done or accomplished"; and *ergo* something is 'unintended' or 'unintentional' if it is "not done with, [or] not arising from, intention."

Our scope is primarily effects in regard to *political decision makers' intentions with respect to the policies they design and adopt*, and this includes various objectives or goals. The main type of evidence of the intentions is the explicit aims or goals stated for a policy intervention. For example, the European Commission states as Article 1 in their proposed Directive on labelling of tyres with respect to fuel efficiency and other essential parameters that "[t]he aim of this Directive is to increase the fuel-efficiency of road transport by promoting fuel-efficient tyres." (EC, 2008, p. 13).

The intervention may also affect more general aims or goals defined for broader policies to which effects of the intervention can be associated. For example, the Commission in its proposal also states that "[a] harmonised labelling scheme will reduce the administrative burden on Member States and the tyre industry. It will avoid fragmentation of the internal market and provide a level playing field for all" (*ibid*., p. 8). We develop the distinction between primary and more secondary intentions further below.

Intentions and interests of other actors than 'political decision makers' may of course also be of interest when policy effects are evaluated, as evaluation literature strongly posits (Kusek and Rist, 2004; Chen, 1996). Furthermore, intentions may not always be clearly stated, or conceived, and they may even be contradictory. Nevertheless, we believe that the most sound basis for a typology to help anticipate unintended policy effects is to assume some goals of the policy makers when they set out to adopt a policy.

For an overview of a range of policy aims and objectives in the transport sector see chapter 2.

3.2.3 Consequences and effects – primary and secondary

We treat 'consequences' and 'effects' as synonymous. Effects are thus generally discussed here in terms of *causation*, whereby a political intervention 'I' has primary intended effect(s) but potentially multiple consequences 'A', 'B', 'C' etc., some of which are likely to be unintended, and/or unanticipated to some degree.

The effects that relate to specific, explicit goals (intentions) we call *primary effects*. In the case of, say, enforcement of speed limit measures near schools to protect school children from accidents the primary effects of this policy (positive or negative) concern children's traffic safety in the area.

Effects may also refer to other objectives, unspecified in this instance, but which nevertheless retain a degree of importance to pertinent actors, which we call *secondary effects.* This could be impacts of the traffic safety measures on other target groups, say safety of adult road users in the area, or on other goals, say keeping police enforcement expenses low, or energy savings in traffic.

'Results' and 'impacts' are related terms for different subsequent *stages* of effects of policies rather than different *goals*. According to European Union Policy Assessment guidelines 'results' are the immediate effects on the recipients of an intervention (EC, 2009). This is very close to the notion of a primary effect adopted here. ''Impact' can be defined as a subsequent change in some endpoint of interest (economy, environment, etc), beyond the direct and immediate interaction with the recipients.

Hence in the example above the 'results' may be considered in terms of changed behaviour of the target group (drivers slowing down or not) while the 'impacts' may be depicted as fewer child fatalities and injuries, or as even broader measures of human or community health, including impacts with regard to secondary effects.

Considering the systemic character of transport, and its status as a derived demand, in many cases secondary effects arise that are either '*transmodal'* (i.e. having an operative influence on one or more other transport modes than the targeted one) or '*transsectoral'* (i.e. having an operative influence on one or more other sectors of the economy) This is in addition to '*intra-sectoral and –modal'* secondary effects within the regulated mode, for example vehicle energy efficiency effects of vehicle safety measures.

The above are of course not mutually exclusive, there can be various both primary and secondary effects of a policy. Before looking for actual examples from the literature we will consider how to evaluate different kinds of effects, how to distinguish more clearly 'good' from 'bad' ones.

3.2.4 'Positive' and 'negative' consequences – the normative aspect

Some consequences can be perceived as 'positive', 'beneficial'; others as 'negative', or 'adverse' by some or all policy actors. Both sides are in principle relevant not least because different policy actors are likely to have different views and opinions.

As already stated, the intentions and objectives *defined in connection with policy adoption* is our basic reference. This means that judgment or valuation of the effects ('good/bad') will

first and foremost be oriented after their influence on fulfilling the intentions, in direct (primary) and indirect (secondary) sense as above; hence we can talk in the first instance about 'intentional' versus 'non-intentional' and 'counter-intentional' effects, rather than necessarily good or adverse ones. The first, 'intentional' ones, are by our definition desirable; the second, non-intentional ones, mean they may be desirable or not, the third type, counter-intentional, arguably the most interesting one, is inherently problematic, for obvious reasons.

First, we consider non-intentional effects that in some way possess a significant degree of operative influence on primary objectives, thereby altering the net expedience, or 'usefulness', of the intervention. Such unintended effects can be expedient (i.e. serendipitous, obtaining a desirable outcome in an accidental way), or inexpedient (i.e. 'adverse', or rather counter-intentional). While the former are interesting and worthy of analysis, they rarely receive the levels of concerted attention devoted to the latter in the academic literature. In contrast, 'adverse' consequences have been identified in *ex-post* analyses of myriad transport policies. These are not rare; many decades ago, in 1967, Hirschman noted 'the centrality of side-effects' (Talvittie, 2006). This refers to a situation where side-effects, rather that original intentions become key for the success or failure of a project.

We need to be careful to label anything as generally 'adverse'. The Oxford English Dictionary (1989), defines 'adverse' as "[something] opposing any one's interests (real or supposed); hence, unfavourable, hurtful, detrimental, injurious, calamitous, afflictive." In the present terminology, we adopt, as already noted, the *policy makers'* view of this, and replace adverse generally with the two categories counter- and non-intentional, where 'counter' means something that works to the opposite (detriment) of reaching a policy objective, while 'non' refers to something generally not on the radar of the policy makers, but still of concern.

Thus, if a particular intervention was designed by policy makers to improve road safety and reduce noise levels, any unintended effect resulting from the intervention, in order to be classed as counter-intentional ('adverse' in this sense), it would have to, in some meaningful sense, be detrimental to those two objectives, for example by surprisingly enhancing the risk of different types of accidents than the ones directly addressed by the intervention. If the intervention affects other objectives than safety and noise as well, say energy use, or enforcement costs, these secondary ones are included in more broad term of 'non-intentional' effects for further investigation; since the degree of detriment to an objective may be less immediately obvious. If it is immediately clear that the secondary effect is counter to a prevalent (if not the primary) intention, it can be termed 'cross counter-intentional'.

In some situations negative consequences of policies are also referred to as 'perverse'. The European Conference of Ministers of Transport provides the following example: "Another distortion, perhaps more common to some European countries, involves tax deductions for commuting costs, which subsidises employees who live far from their place of work. These examples show how land-use and transport pricing and fiscal policies can have perverse effects when they encounter each other" (ECMT, 2002, p. 39).

The notion of 'perverseness' here refers to contradicting effects of two *policies*, not just between a policy and an objective, as for the notion of 'counter-intentional'. To avoid again the strongly normative connotations we maintain the term 'counter-intentional' (for opposite to *target*) and use 'contradictory' (for opposing *measures*), respectively.

Figure 3.1 depicts the general concepts of primary (intentional and counter-intentional) and secondary effects. A further category is added, the net effect, as a sum of the effects in different directions with regard to the objective. In the examples, the net is positive, which of course need not be the case. The secondary effect is not 'intentional' but may consist of more or less serendipitous and cross-counter-intentional ones. The 'net' effect' of secondary effects is considered per impact, but may also be conceived across impacts if methods for

aggregate consideration can be applied. Figure 3.2 illustrates the notion of contradictory effects.

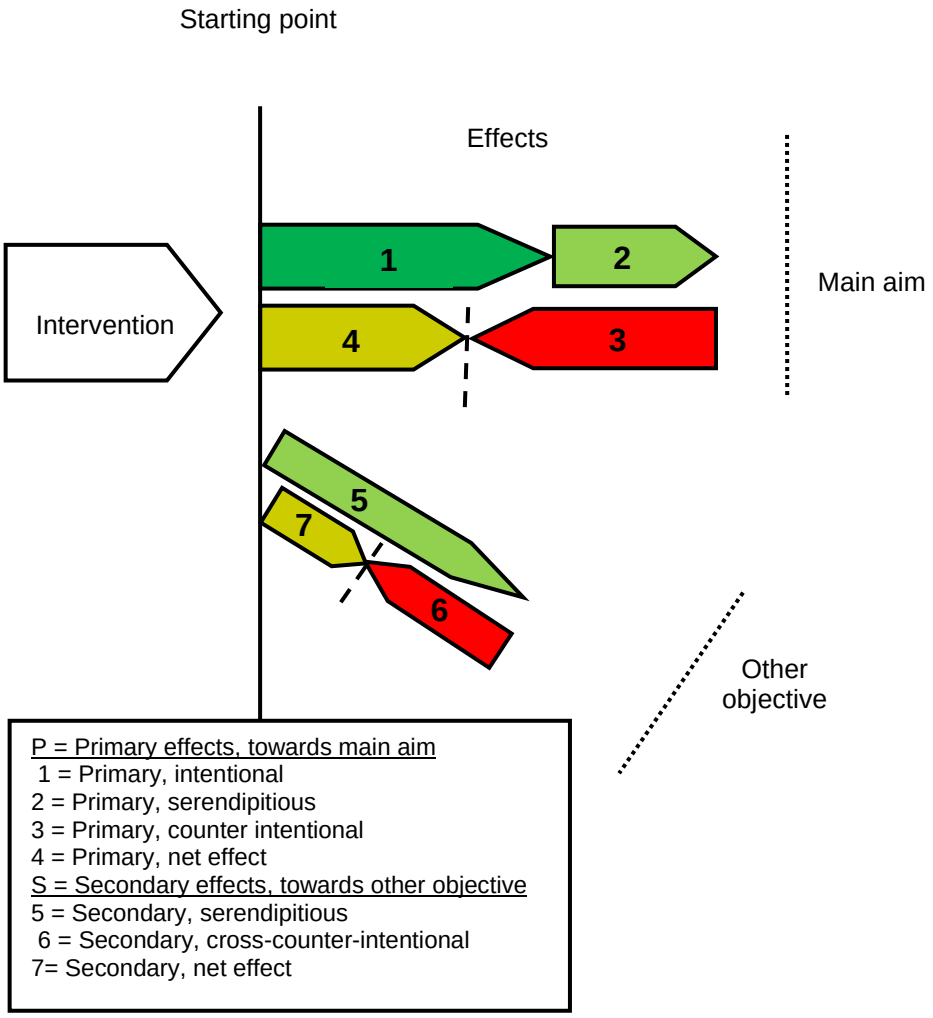

Figure 3.1 Basic types of policy effects – primary and secondary

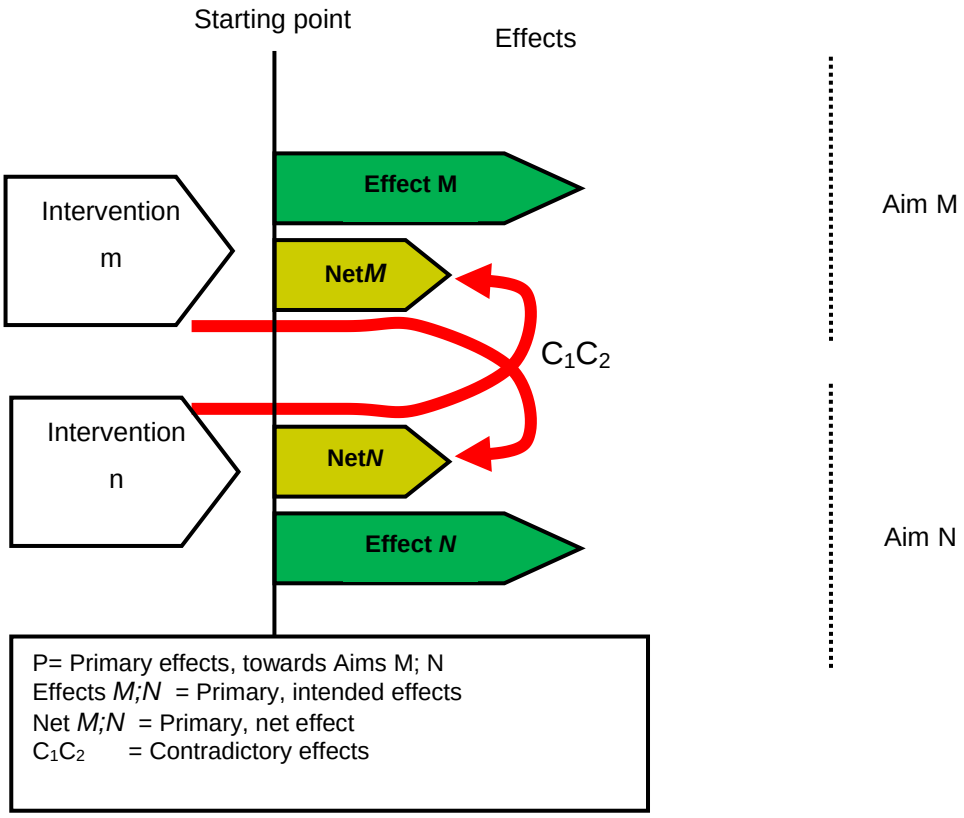

Figure 3.2 Contradictory effects M and N *from interventions m and n towards aims M and N*

A striking example of *a primary counter intentional effect* is provided by Robinson (1996) in her detailed analysis of the introduction of mandatory bicycle helmet legislation in Australia. The legislation was introduced explicitly to reduce the proportion of cyclists suffering head injuries and a superficial analysis of the available data appeared to indicate that the legislation had achieved its intended effect. In the state of Victoria, for example, the percentage of cyclists wearing helmets increased from 31% to 75% in the first year of the legislation. Similar trends were evident elsewhere in the country, with the percentage of child cyclists in New South Wales wearing helmets increasing from 31% to 76% (reaching 85% for adults). Moreover, the proportion of head injuries in hospitalised cyclists fell by 13%. However, longitudinal data also revealed that the mandatory legislation had triggered a reduction in the number of child cyclists up to 15 times greater than the increase in the number of children wearing helmets—suggesting that a major unintended effect of the legislation had been to discourage cycling.

Further evidence from attitudinal surveys lend weight to this criticism; 325 cyclists were asked "would you cycle less if helmets became compulsory?" 28% said yes. Given that Hillman (1993) estimates the health benefits of cycling to outweigh the health costs of not doing so by a factor of 20 to 1, Robinson (1996, p. 463) logically concluded that the legislation "may have generated a net loss of health benefits to the nation." To reiterate, Robinson's (1996) work can be said to illustrate a *primary* counter-intentional effect as the unintended effect was detrimental to the same objective that the intervention arguably was designed to influence: the health of the nation.

The same form of primary effect has been noted elsewhere in the literature on surface transport, particularly with respect to policies designed to curb the extent of private car travel in European cities. Goodwin (1998), for example, highlights the complex adaptive problems that result from increased supply of available transport infrastructure, particularly road building schemes. Using the example of a bypass, he contends that although the intended effect of the additional road space is to alleviate traffic and congestion along the original route and increase speed on the new route, a counter intentional effect of its construction may be an overall increase rise in net travel—the now widely-recognised phenomenon of induced demand (Noland, 2001).

Similarly, in the context of superstore location, Hay (2005) discusses the results from a series of simulation modelling of UK policies designed to restrict superstore development on the urban outskirts. Insofar as the policies are intended to reduce private car use for shopping purposes, Hay (2005) argues, they are admirable. However, the results of the modelling exercise indicate that a concentrated distribution of stores in the urban core, as per the policy, rather than a dispersed distribution, would significantly increase net trip length for shoppers. If increasing trip length is not mitigated by other effects it is thus implied that the policy to concentrate stores in the city centre may have negative consequences for congestion, pollution, household costs and accidents. As Hay (2005) concludes, the policy would have to engender a major modal shift away from the private car in order to offset such a major adverse effect. Cairns (1995) has done similar research on the topic of supermarket location (see also Goodwin, 1998). Using GIS modelling, surveys of shoppers and interviews with retailers, she argues that restrictions on store development on the urban periphery may have the unintended effect of leading to calls for greater car parking provision in city centres. Cairns (1995) concludes with the observation that a more effective policy would be to support the (then nascent) home delivery services offered by supermarket chains, rather than the introduction of additional development restrictions.

As Marshall and Banister (2000) note in the context of the EC DGVII DANTE project, however, relatively novel measures such as home delivery services should not be considered as panaceas for the problems of car dependency in European cities: all switching and substituting measures are liable to exhibit unintended effects of their own. For example, in their review of an innovative car parking scheme in Aalborg, Denmark, it was found that

while trip length and overall vehicle kilometres travelled had decreased as a result of the intervention, the reduction in overall traffic was just 0.3%. This 'limited' effect was further jeopardised by the fact that the scheme made it significantly easier for drivers to locate parking spaces in the city (an intended effect) and thus, as the authors note, this may encourage additional car travel into the city centre (an unintended, adverse effect), thereby offsetting the initial benefits of reduced traffic. Another case study, examined in the DANTE project, is that of a teleworking scheme in the Netherlands revealed similar unintended effects, albeit more limited ones. It was found that commuting trips saved through teleworking may have been replaced by additional non-work trips and by additional trips taken by other members of the teleworkers' households (*ibid*.).

As noted previously, in addition to primary unintended, adverse effects, there is evidence in the literature of *secondary* non-intentional effects. To restate, these arise in situations where a political intervention has undesirable consequences for an objective, or objectives, beyond those which the intervention was explicitly seeking to influence.

Some of the urban planning literature is particularly illustrative of this phenomenon. Goodwin (1998), for example, summarises the work of Hass-Klau (1993) and colleagues on pedestrianisation interventions in European cities. The intended effect of the interventions was to improve the quality of the urban environment, specifically the nature of what has more recently been termed 'walkability' in certain districts (see Southworth, 2005). While this intended effect was largely realised, however, the intervention also appeared to have the unintended effect of discouraging of retail trade by making it more difficult for individuals to access shops by other means, particularly by private car. As it turns out, however, these are likely to be short-term effects only and primarily arise due to the disruption of shopping patterns as a result of the intervention's implementation phase. Indeed, it appeared that the pedestrian footfall in newly pedestrianised areas was between 20% and 40% greater prior to the schemes' introduction, thereby leading to a serendipitous increase in the net volume of retail trade (Hass-Klau, 1993).

As this example indicates, the transsectoral unintended effect—that of short-term decline in retail sales—was precipitated by an intermediary transmodal effect: reduced accessibility by private car. Yet the literature also contains examples of secondary non-intentional effects caused by the same mode of transport that the intervention was designed to influence. On first consideration, this appears to be analogous to a primary effect, but the complexity of contemporary transport systems are such that individual modes perform a multitude of differing roles in different spatial and temporal contexts, which thus subject them to interventions aimed at variety of objectives. In other words, an intervention designed to influence a particular mode in favour of one objective, can have adverse, unintended effects on another objective via the same mode.

Consider, for instance, Parkhurst's (1995; 2000) comprehensive analyses of the effectiveness of bus park and ride schemes in UK regional cities. The principal intended effect of these interventions was essentially twofold: first, to reduce overall traffic in the central urban area by encouraging modal shift from private car travel to bus travel; and second, to attract more people into city centres for economic reasons. As with previous examples, the Parkhurst's (1995; 2000) survey data demonstrated the intended effects were realised: between 42% and 81% of the scheme users questioned had previously travelled by private car all the way into the central urban area from the urban hinterland, and between 2% and 12% had previously travelled to other locations altogether. However, between 5% and 40% had previously made their entire trip to the centre by public transport; thus a major unintended effect was the creation of additional car trips in the hinterland *beyond* the geographical area covered by the park and ride services. Clearly, this had a detrimental impact on parallel objectives relating to the reduction in absolute travel by private car, regardless of urban/rural location (see also Marshall and Banister, 2000).

A more subtle type of non intentional transsectoral effect is reported in Levine *et al*.'s (2006) analysis of seatbelt law enforcement in the southern United States. The authors examined the consequences of the disparity in so-called 'primary law' legislation between the adjoining US states of Louisiana and Mississippi. In Louisiana, legislation was passed allowing police officers to apprehend any motorist seen not wearing a seatbelt. Here the authors observed a significant decrease in the disparity between African Americans and White Americans with regard to motor vehicle crash mortality rates. In Mississippi, on the other hand, efforts to introduce a similar legislation had been thwarted by concerns raised over potential discriminatory racial profiling of motorists by law enforcement agencies. Here a significant *increase* in the racial disparity was observed. The authors conclude that the "successful opposition to primary seat belt laws may have the unintended effect of worsening racial disparities in mortality" (*ibid*., p. 143).

Finally, in the context of secondary non-intentional effects, it is worth noting that contemporary transport systems can also be the target of transsectoral effects that originate elsewhere (Hallsworth *et al*., 1998). Clearly, as transport is essentially a derived demand, this is no surprise. However, recently the policy implications for transport of policy developments in other areas have received more attention, not least in the light of concerns over growing transport impacts on climate and the environment (EEA, 2008). For example in the area of food production, transport has been highlighted as an important element of the logistical chain from 'farm to fork', with the potential to influence transport emissions throughout the whole process of producing and consuming food. Many factors of food production and consumption, ranging from purchasing power, domestic availability of foodstuff, product expiration dates, marketing, and technological developments have been identified as influencing transport demand, for instance by sometimes leading to increased transport (EEA, 2008, p. 9). As another case, a foresight study by the Interdisciplinary Centre for Comparative Research in the Social Sciences found that developments in key areas like demographics, attitudes, labour markets, institutional arrangements and science and technology all may significantly affect trends in the transport sector (ICCR 2004). For example, the overall ageing of the population is expected to affect mobility through higher rates of employment amongst people aged 60 and above, which will generate higher levels of commuting travel.

3.3 Building a typology of unintended consequences

3.3.1 'Knowledge, attention and anticipation'

Effects such as the above may be known or not known, anticipated or not anticipated; receiving attention or not; they may be neglected, misunderstood or suppressed. Knowledge about effects is critical for informed action. Is there knowledge or not? Who possesses it? If not, can it be produced; and the effects modelled? How certain is the evidence? The topic of knowledge appears at a first glance as an opportunity to introduce further *types* of effects (e.g. 'unknown' effects versus 'known' ones). However these phenomena refer more to whether some possible effects are perceived or not in a given situation. A key interest in addressing this question is that it may provide steps towards understanding why counter-intentional effects may arise, and therefore possibly how to mitigate them.

We will first make a basic distinction between situations were effects are 'known' (labelled 'W') versus 'not known' (X).Then we map these onto the previous categories of intentional (here labelled 'A') and non- intentional ('B') effects, which are divided into two, nemely, 'B1' counter-intentional effects relating to the primary objectives, and 'B2', relete to other objectives and hence correspond to the category of Secondary effects This is illustrated in Table 3.1.

Most important here is that there is no necessary match between intention and knowledge. There may be some counter-intentional effects that are known in advance and therefore possible to take into account, whereas others are not and therefore impossible to take into account directly. Conversely some intentional effects are known, while there may also be unknown (e.g. serendipitous) effects with regard to the intention. But knowledge of effects with regard to intentions are, *ceteris paribus*, more likely to be operational if intentions, aims and targets are clearly specified, and conceived with operational concerns in mind.

In Table 3.1 the categories are defined and illustrated with a simple example of a hypothetical measure to reduce the fuel consumption of transport by introducing a fuel efficiency standard.

		Consequence dimension		
		A. Intentional	B. Non intentional	
			B1 Counter intentional	B2 Secondary
Knowledge dimension	W. 'Known'	The consequences that decision makers intended with the intervention ------- *Average fuel consumption of new vehicles is reduced; less fuel is consumed*	Counter-intentional effects that were anticipated at the time of decision ------- *Cars are driven longer and consume more fuel due to lower fuel cost/km (rebound effect); models may predict the effect*	Secondary effects that were anticipated at the time of the decision ------- *Longer distances driven lead to increase in congestion; models may predict the effect*
	X. 'Unknown'	Advantageous effects that are not known; serendipitous ------- *New cars inspire some people to 'green driving' lifestyles, saving additional energy*	Counter-intentional effects not known at the time of decision ------- *Car manufacturers economically challenged by the standard abandon plans to develop even more energy efficient cars*	Secondary effects not known at the time of the decision ------- *Less public propensity to use alternative travel modes due to cheaper car travel, leading to line closures*

Table 3.1 Consequences versus Knowledge, with a speculative example of a fuel efficiency standard. In the example the 'A' effects relate to the purpose of fuel saving effects in a positive way, either as known (anticipated) AW or not known (unanticipated) AX. B1 are negative effects with regard to the fuel saving intentions, again known (B1W) or unknown (B1X). B2 effects are ones that influence other objectives than fuel efficiency, such as congestion or use of public transport.

In the example it is assumed to be known that fuel use of the new vehicles will decrease per kilometre, which corresponds to the intention (AW). The counter intentional effect that cars are then driven longer (B1W), is also known and may be modelled in advance, possibly with associated models for some secondary effects (B2W). The unknown effects include here some that people might change behaviour in other ways that are supportive of the intention (AX), while some industries are forced to give up unadvertised plans for more radical fuel

savings strategies (B1X). Unknown secondary effects could include effects on public transport use (B2X). The example is highly stylised, and serves mainly to cross the two main dimensions, that will be extended further below. It is clear that the main interest would be to learn more about the B1X and B2X types of effects.

It must be noted that the question of knowledge of policy effects of course cannot be adequately dealt with as simply as an 'either- or' situation. First of all we cannot easily delimit the relevant knowledge for a policy decision to such knowledge possessed personally by decision makers in the same manner as we could for the intentions, where we could claim decision makers legitimately 'own' the intentions when making a policy decision within their jurisdiction. Decision makers are hugely dependent on knowledge resting elsewhere, commissioned to them, being produced during the process, or embedded in assessment tools like transport, safety or air quality models. In other cases new knowledge may be called upon, commissioned, or measures taken to make it available in the longer run (e.g. strategic research programs), and decisions may even be postponed until it is available. Hence knowledge availability is generally far more plastic than assumed in Table 3.1.

One way to depict this plasticity is by examining the relative distance between knowledge production and the decision 'situation room'; such as in the "ladder of research utilisation" notion (Landry *et al*., 2001) – see Table 3.2. Still, relevant research cannot always be assumed to exist or be in the 'pipeline'.

Stage 1 Transmission:
"I transmitted my research results to the practitioners and professionals concerned."
Stage 2 Cognition:
"My research reports were read and understood by the practitioners and professionals concerned."
Stage 3 Reference:
"My work has been cited as a reference in the reports, studies, and strategies of action elaborated by practitioners and professionals."
Stage 4 Effort:
"Efforts were made to adopt the results of my research by practitioners and professionals."
Stage 5 Influence:
"My research results influenced the choice and decision of practitioners and professionals."
Stage 6 Application:
"My research results gave rise to applications and extension by the practitioners and professionals concerned."

Table 3.2 Ladder of research Utilisation (adapted from Landry et al., 2001)

In addition to the remoteness of the knowledge there are degrees of quality, certainty, suitability and acceptance of existing knowledge as well as knowledge to be gathered or produced. The quality can be defined in terms of how valid, reliable, accurate, and credible it is and how safe predictions of policy outcomes it allows. In terms of indicators of potential policy success, it may also matter to what extent the knowledge is operationally related to policy objectives; and pointing towards policy levers (say, average speed of traffic flow, or price of a public transport fare card) and whether the knowledge is based on assumptions and values that are shared or more controversial (Turnhout *et al*., 2007; Innes, 1998; Farchi *et al*., 2006). More broadly Cash *et al*. (2003) summarise three fundamental factors associated with the likelihood that knowledge and evidence from scientific assessments are used to inform public policy rather than being ignored or discredited, namely its:

- Salience, which means the perceived relevance of information for a policy actors' choices
- Credibility, which refers to information perceived as meeting standards of scientific quality and trustworthiness

- Legitimacy, which refers to whether the process to provide the knowledge is seen as politically unbiased and fair, or potentially influenced by certain interests

These features of knowledge use are not systematically connected to unintended effects, but illustrate general barriers that may contribute to blur the dichotomy between 'known' and 'unknown' effects.

Further inspiration to conceptualise the critical dimensions of policy knowledge can be found in American sociologist Roberts Merton's work. In his article, 'The Unanticipated Consequences of Purposive Action' Merton (1936), identifies and expands upon five reasons for the presence of unanticipated effects arising from purposive action (that is, including policy), four of which are considered relevant here (see Table 3.3). Merton emphasises four other types of barriers for overcoming knowledge gaps with regard to policy effects, including ignorance, error, bias and feedback effects. In a similar vein we draw from the work of the economist Frank Knight, cited as the originator of an important distinction between risk and uncertainty (Runde, 1998). In popular perception, 'risk' involves effects for which knowledge and parameters are available to assess the likelihood of some outcome; 'uncertainty' refers to a more genuine lack of systematic understanding of causal relations. Noise effects on human productivity may partially be predicted and a risk assessment made. Noise effects on human creativity may be impossible to parameterise or even conceive.

The major reason, and arguably most intuitive, concerns limitations to the 'existing state of knowledge'. This again refers to two different conditions. The first feature, concerns *the complex subject matter of the social sciences*, particularly the fact that the relationships central to the process and consequences of purposive action tend to be stochastic, or conjectural in nature. The second feature refers to the quality of the individual *perceptive abilities* and the disparity between knowledge that can be conceivably obtained and knowledge actually obtained. Under this there may be several forms of *ignorance* on the part of the actors involved. As Merton notes, ignorance becomes salient by the fact that people often need to make decisions even with incomplete information.

The second reason for the presence of unanticipated effects is to do with (actor) *error*. This can occur in all phases of a purposive action: problem appraisal, action formulation, or action implementation. One form of error, when actors only partially consider the diverse array of elements (and, *ergo*, potential consequences) that exist in a given situation. This may occur as a result of an unintentional omission (i.e. accidental neglect), or as a result of some explicit refusal to consider further elements of the problem in a systematic manner.

The third reason for the presence of unanticipated effects, Merton terms the 'imperious immediacy of interest'. This is essentially an argument about *time preference*, which let all elements of a decision situation remain acknowledged, while the value accorded to each one may change. As Merton notes, this is not necessarily antithetical to undertaking systematic and exhaustive reviews of potential consequences, but in practice concern for the former may override the latter and thus give rise to secondary unintentional effects as described above.

The fourth reason Merton offers in explanation of the presence of unanticipated effects is related to the presence of feedback in complex adaptive systems. "Public predictions of future social developments are…not sustained precisely because the prediction has become a new element in the concrete situation, thus tending to change the initial course of developments" (*ibid*., p. 904). Unique to human systems, and particularly relevant to political interventions, these can be extraordinarily powerful; as when Marx and Engel's dystopian narrative of the power of capital over labour arguably influenced the proletariat to take action.

Table 3.3 Merton's unanticipated effects

3.3.2 Categories of effects and situations- the core typology

We divide here situations with regard to the 'known'/'unknown' distinction into four (W, Z, Y and X) rather than two (W and X) broad categories, centring on the role of conceptual causal models linking interventions to effects; or 'program theories' to speak in the language of evaluation research (Johnson *et al*., 2009).

- (W) Situations where recognised causal models linking intervention to effects exist and are applied to rather correctly predict effects
- (Z) Situations where recognised conceptual models are applied, but the actual application of them do not predict the effects completely
- (Y) Situations where causal assumptions are made in policy, which however fail to take into account significant recognised conceptual models, or evidence
- (X) Situations where there is no agreement over causal models, or where no models to predict cause and effect are available and might not be feasible

The categories are inspired by, but do not correspond fully to Merton's categories.

In the following we will define a range of categories to combine these situations with the types of effects introduced earlier, thus detailing the overall categories laid out in Table 3.1. This will form the core of the typology. Each category is given a unique algebraic symbol referring to the general groups in Table 3.1 as further subdivided above and below, but also more popular name labels for more intuitive recognition are proposed. Examples are given to illustrate each type; the examples are for clarification purpose only, and should not necessarily be taken to suggest actual effects, even if references to literature are sometimes given.

Correctly anticipated effects

AW) or '**Bulls eye'**. Correctly anticipated Intended Effect: The anticipated effect occurred and tendency and scale of its impact were anticipated correctly. For example, a reasonably accurate model of traffic response to signal timings may allow predicting and obtaining a 6% savings of fuel consumption from implementing the measure on a city network basis (Turner *et al*., 1999).

BW) or '**Timely warning**'. Correctly anticipated unintended effects: The anticipated effect occurred and tendency and scale of its impact were anticipated (perhaps mitigated) correctly. For example, the 'rebound effect' when introducing a fuel efficiency standard, may be calculated to be max 20% (International Transport Forum Leipzig, 2008), and found to be verified after the implementation of a program that is calibrated to take this effect into account. Another example can be potential damage to roadside trees from increased intensity of salting to prevent accidents on icy roads. The tree damage effect may be acknowledged and appropriate measures to protect the trees taken already at the road planning and management stage (Pedersen *et al*., 2000). The first example belongs to the category 'B1W' in Table 3.1, while the latter one is 'B2W' (referring to secondary effects).

These categories where effects are correctly anticipated are not of prime concern for OPTIC and are not expanded further.

Underestimated intentional effects

AZ1) or '**Overdone**'. Policy-makers have a relatively correct causal model of the policy situation (i.e. it includes the relevant major variables), but nevertheless their 'weighting' of

the various elements is somehow inaccurate, thus the predicted outcome improve notably from the actual outcome in terms of magnitude or timing. For example, if a new fuel based vehicle tax aiming to reduce fuel demand leads to a series of stronger adjustments in purchasing behaviour than anticipated.

AZ2) or **'Spill over**'. Policy-makers here also have a relatively correct causal model of the policy situation, but they omit a part of the whole causal system from their considerations, for example because some effected area does not fall under their jurisdiction. This could include traffic calming efforts leading to a reduction in speeds on a road network, near a municipal border where some of the speed reduction takes place in the neighbouring municipality, and is therefore not considered.

Again these 'A' types of advantageous effects are less important, but they are indications of incomplete assumptions, that could therefore suggest the presence of other – also possibly negative – faults and the need for better foundations. We now turn to presumably more important situations and effects.

Underestimated Non-intentional effects

B1Z1) or '**Off the Mark**'. Also here, policy-makers have a relatively correct causal model of the policy situation (i.e. it includes the relevant major variables), but again their weighting of the various elements is partially inaccurate, thus the predicted outcome worsens notably from the actual outcome in terms of magnitude or when it occurs. In this case a counter effect, or 'drag' is underestimated or overlooked. For example, if a vehicle scrappage program is introduced, it may increase the average fuel efficiency of new vehicles sold, but not as much as anticipated because price elasticities are overestimated. Or a policy measure to reduce the use of mobile phones while driving is introduced, but the policy underestimates the complications involved in detecting violations, and thus overestimates the long term effects of compliance (Caird, 2008; Dragutinovic and Twisk, 2005). In both situations, evidence may in principle be collected and applied to readjust the parameters of the underlying models.

B1Z2) or **'Not-In-My-System (NIMS)'.** Policy-makers have a relatively correct causal model of the policy situation that includes the relevant major variables, but they omit a part of the whole causal system from their considerations. Again it could be because it does not fall under their jurisdiction. For example if traffic calming efforts leading to a reduction in speeds also lead to some detouring cars using higher speeds through a neighbouring municipality, which are not considered. An example on a larger scale may be if measures to promote the use of biofuels are introduced in order to help reduce greenhouse gas emissions, without fully considering upstream emissions from fossil fuel energy needed to cultivate and harvest the crops, as these may occur abroad. In this category the unintended effects (speeds, greenhouse gasses) are still of the same type (hence, primary) as the ones addressed by the policy intention, but parts of the interactions are left out. We do not consider unintended secondary effects (B2) as part of the causal models, but address them further below.

B1Y1) or **'Blind spot'**. Here policy-makers assume an inaccurate causal model of the policy situation (i.e. it ignores relevant major variables or interactions), and thus the predicted outcome of the intended effect differ significantly from the actual outcome leading to counter-intentional effects, to the extent that it may be levelled out or negated entirely. This is analogous to John Maynard Keynes's (1921) concept of 'subjective chance', a situation that differs from 'objective chance, when failures can be ascribed to fundamental unpredictability of the situation (see 'BX' below). In the present category there is some degree of knowledge misspecification, be it due to ignorance, 'optimism bias', time pressure, regulatory capture, 'hubris' or other causes. In each of these cases the possible remedy could differ. Blind spot is arguably one of the most critical situations, as it refers to a direct failure with regard to intended effects, and one most policy makers would like to avoid. In a worst case it may be

'***blind spot with a vengeance***', if the counter effect is so strong that the effect actually goes in the opposite direction to the one intended by the policy. This is expressed by Sunstein (1997, p 116) as a 'regulatory paradox', like if the US Clean Air Act' actually made the air more dirty.

An example of blind spot could be European policy makers failing to adopt low noise car tyre policies as part of a plan to reach road noise objectives because of the trade off between positive noise effect and traffic safety of tires. According to Sandberg (2001) the European Council and Parliament indeed assumed such a position in 2001, even if recent available research had confirmed this conflict to be a myth.

Another example could be the introduction of a vehicle scrappage scheme with the double purpose to help boost a domestic car industry, and to replace older polluting vehicles with new greener and more energy efficient ones. According to De Palma and Kilani (2008) both objectives may be elusive in as much as current policy models do not take into account the potential effects of a scrappage premium to increase the value of used vehicles, which could actually delay rather than speed up scrappage. Recent studies of such programs in the US and UK (see e.g. Sivak and Schoettle (2009); SMMT (2010) and Haugh et al. (2010) indicate limitations to the causal assumptions behind policies in this area with regard to either fuel savings or industry recovery. This 'blind spot' situation is probably very common for a wide range of policy effects

A third example could be again the case of biofuels as a means to reduce greenhouse gas emissions. One of the critical potential consequences of increasing the area for producing such fuels are the so-called 'indirect land use effects', leading to additional greenhouse gas emissions when farmers across the globe clear land (such as carbon-capturing forest) to grow other crops needed to replace food and feedstock that have been diverted to biofuels (Devereaux and Lee, 2009). The current EU directive does not take into account this effect to calculate greenhouse gas reductions from various biofuels, whereas recent US legislation does so. According to Searchinger et al. (2008) ignoring this effect can be an example of what is here called 'blind spot with a vengeance', as some biofuels can be calculated to actually increase rather than decrease CO_2 emission compared to fossil fuels if these effects are taken into account. However, it remains debated if the knowledge today is sufficiently solid to provide actual default numbers for certification of biofuels as in the US case, or if policy is considered safer by not making 'scientifically' based final assumptions in this regard as in the EU. Either way there are recognised blind spots in existing regulations, although some would classify them rather as B1X further below, at least for the time being.

B2Y) or **'Secondary blind spots'** Here the inadequate causal assumptions extend into secondary effects, which may in principle be known before, but are in this case not discovered or considered in the analysis of the policy makers, again for potentially a variety of reasons. The elements ignored in this instance can encompass everything on the spectrum of secondary effects, including all kinds of economic, social or environmental consequences, and wider impacts. The effects could belong to this category as long as there would be potential opportunity to take them into account by sufficiently careful consideration of existing or commissionable knowledge, rather than them being of a more principal incomprehensibility as for category B2X below. The difference between this category and the former one from the policy making point of view of knowledge is that it may be less obvious what kind of knowledge to consider as causal models encompassing secondary effects may involve a different, cross modal or -sectoral conceptualisation of the intervention, quickly leading into a whole range of complications and possible speculations Some of the mechanism that may produce 'blind spots' are not related only to lack of knowledge, but may also be caused by to phenomena such as assymetric information (Laffont & Tirole 1993) or rent seeking behaviour among decisicon makers and administrators, who may have their own interest in highlighting some effects rather than others (Hindriks and Mayles 2006). Compartmentalised decision making (Brignall and Model, 2000), or un-coordinated policies

(Peters, 1998) may provide additional partial explanations for the occurrence of secondary blind spots. Possible scientific explanations are discussed in Appendix 7.2

It is instructive to use the case of the vehicle scrappage scheme to illustrate a potentially wide range of secondary effects, as illustrated in Figure 3.3. Taking departure from the UK scheme managed by the Department for Business, Innovation and Skills, there are three main intentions:

- To support domestic car industry
- To improve road safety, and
- To improve the environment

The UK scheme was introduced in May 2009. Basically, a car owner scrapping a vehicle of 10 years of age or more receive a £2,000 discount when buying a new one that fulfils certain minimum requirements. The scheme is funded half by government and half by industry and covers up to 400,000 vehicles. According to the auto industry itself the program is very successful in terms of boosting vehicle sales and helping to speed up the introduction of more fuel efficient vehicles (SMMT, 2010). However, there is limited evidence about, for example, the extent to which the effects are attributable to the scheme and how the program influences consumer behaviour in a holistic sense.

As depicted in Figure 3.3, a number of positive and negative correlations between the program, its goals and a various additional possible impact pathways may be envisaged. According to the causal mapping, anticipated effects (text in black) point to simple relations leading to likely program success (the 'program theory'). However, a number of additional causal effect links may be at work (text in blue). For example, the program theory may not consider (counter intentional) environmental effects connected to shipping and disposing of scrapped or production of new vehicles. On the other hand, it may overlook additional economic industry benefits from spare parts. A further analysis of possible long term effects (not shown) adds considerable further complexity. For example, it is possible that a perceived success of the program will lead to lobbying from industry for a continuation of the scheme, which again could be associated with a number of reactions and intermediate effects among government officials, consumers and industry representatives ranging from contributions to sustain a norm of automobility in the sector to the promulgation of a broader recycling ethos.

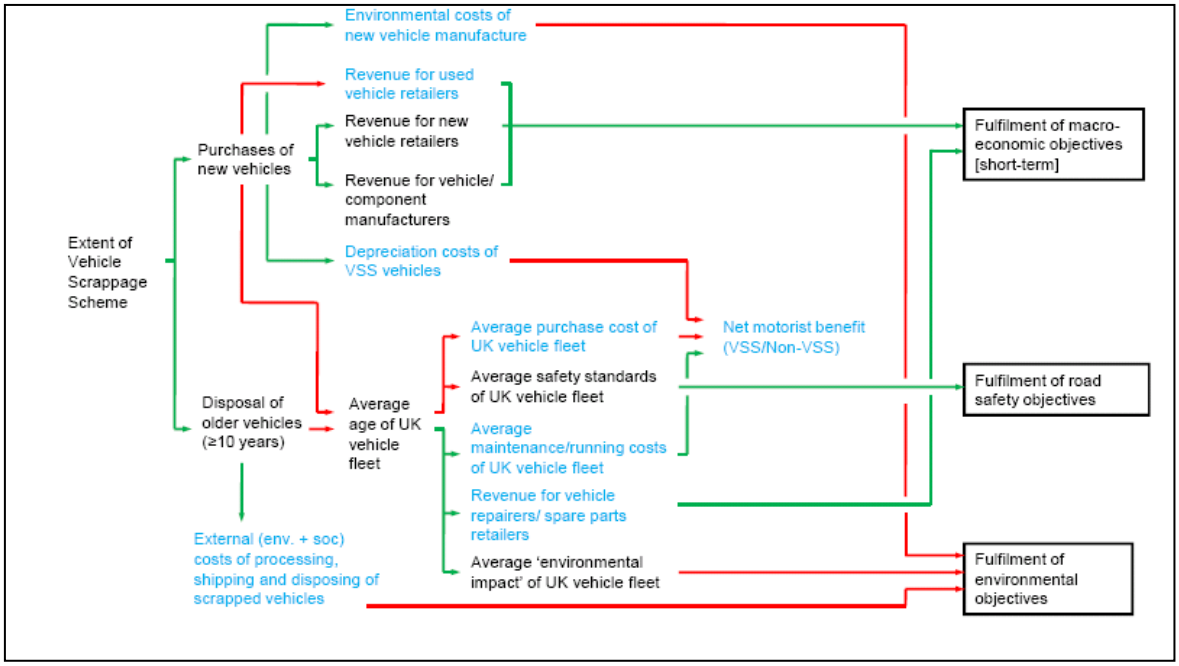

Figure 3.3 Speculative causal map concerning a range of intended ('positive') and non-intended ('negative') effects of a UK policy scheme to introduce vehicle scrappage. Short term effects. See further discussion of this approach in Chapter 4.

B2X) or '**Holy Smoke!**' An effect occurred that was not known before, never occurred in that policy context or have only existed as speculation. This is analogous to Keynes's (1921) concept of 'objective chance', as in such a situation policy-makers' causal models could not possibly incorporate certain variables. In some cases the effects materialise forcefully up front, as for example the consequences of ineffective airport safety controls indirectly allowing the unprecedented disaster to occur in New York and Washington on 11 September 2001. One may find that the outcome was beyond comprehension, or rather that it was due to a series of blind spots (The 9/11 Commission Report 2004). In other cases cause and effects relations may only be uncovered following long periods of extensive research, if ever. For example, ballast water carried by ships have been found to disperse a wide range aquatic organisms –jellyfish, crabs, clams, fish, snails, etc. over long distances and sometimes release them as alien or invasive species in other waters where they may disrupt local ecosystems and crowd out indigenous ones (NRC, 1996). To foresee such an effect in advance seem at least to require development of an ecosystems based thinking. More recently the potential introduction of bacteria and viruses through ballast water has become a possible concern, which however remains very little studied (Battelle, 2000). Potentially this category is almost endless, especially if one considers all possible secondary effects across modes and sectors and questions such as what the bicycle has meant for the alleged happiness of Danes, or what full motorisation will do to China and the world.

The above categories are here defined as distinct although they are really only points on several continua that can be frozen only by convention. For example, anticipations of effects will rarely be 100% correct; 'inaccurate' weighting among causal variables can be on a bigger or smaller scale; system boundaries can be set up in ways that are more or less blind to spill over effects, and ignorance can be fundamental or passing, for example depending on where on the ladder of research utilisation potentially enlightening knowledge presently sits (if it has entered it at all). Sometimes 'self-defeating results' of certain policies are proclaimed, but to sort out to what extent and in which situations this is actually the case or not, may not be possible even after careful scrutiny of evidence or extended academic exchange, as in the case of whether widening of urban roads actually leads to a slowing of travel speeds (Mogridge, 1997). The categories above are intended to help provide an overview of some main types of effects.

3.4 Conclusions

A review of types of non intentional policy effects has been drawn up by working through a number of key dimensions, by equipping each dimension with definitions and distinctions, and by combining several them into a tentative typology to be applied in OPTIC and developed further.

The work in such a typology is at one time helped by a rich terminology and many strains of research, but at the same time challenged by such a diversity of perspectives, categorisations and interpretations; it is hard to imagine a 'one size fits all' typology. Still it should be useful to have these kinds of distinctions clearly in mind, as they are likely to require different kind of countermeasures in order to be avoided.

The key dimensions and categories proposed to consider in the preliminary typology include the following:

1) a general outline and vocabulary of policy measures, policy aims and policy effects as related to transport in general

2) a choice of perspective from which the 'effects of interest' are to be seen and evaluated (namely the position of the policy makers and their stated intentions, that is a 'classical 'policy analysis approach)

3) a terminology of effects with regard to a logic centred on the transport policy maker in a specific situation, hence

- Intentional, non-intentional, counter intentional, cross-counter intentional (contradictory)
- Primary, Secondary
- Result; (effect=consequence); impact
- Intramodal, transmodal; transsectoral,

4) a terminology of the knowledge situation, focusing on the status of causal model or 'programme theory'

- Situations where established causal models linking intervention to effects exist and are applied to rather correctly predict effects
- Situations where recognised conceptual models are applied, but the actual application of them do not predict the effects completely
- Situations where causal assumptions are made in policy, which however fail to take into account significant recognised conceptual models, or evidence
- Situations where there is no agreement over causal models, or where no models to predict cause and effect are not even feasible

5) a core typology with 10 main types of effects/situations, spanning a range of effects (intentional, counter-intentional and secondary non-intentional ones) and the range of knowledge situations, nicknemaed as follows, with the most importants being the following six ones,

- 'Bulls eye', Correctly anticipated Intended Effects:
- 'Timely Warning', Correctly anticipated unintended effects
- 'Off the Mark', misspecification of broadly correct causal assumptions
- 'Not-In-My-System', misspecification of system boundary of broadly correct causal assumptions, leading to spillover negative effects
- 'Blind spots' (primary, secondary), Counterintentional or other non-intentional effects dues to an inaccurate causal model of the policy situation
- 'Holy smoke' An effect of a policy intervention occurs that was not known before, or could not exist other than as speculations

It would be possible to detail the typology further and add more dimensions, for example with regard to issues like reversibility/irreversibility; perspectives of different beneficiaries of interventions etc, but it is deemed that adding further complications to the typology at this point could hamper a useful discussion.

Appendix 7.2 presents a brief review of explanatory factors behind non-intentional effects, within three fields of research (technical/natural science; economics; political science) and three categories of effect logics (political acceptance; implementation feasibility; instrumental effectiveness) that each of these types of research primarily helps to explain.

4 Towards a framework for policy packaging

4.1 Introduction

In the previous chapter we outlined a typology of non-intentional effects, highlighting those which we deem to be particularly significant for policy-making. In this chapter, we examine the notion of policy packaging and—alongside other concerns—seek to develop a framework through which the likelihood and severity of such non-intentional effects may be reduced and/or rendered manageable. It is vital to stress at the outset to this chapter that we are not seeking to propose a 'one size fits all' approach to policy packaging; indeed, we are aware that there are likely to be several approaches to successful packaging, almost all of which can be considered viable to a greater or lesser extent. As a result, this chapter is not intended to be read in a normative sense. Nevertheless, we do actively seek to converge on a set of interrelated principles that logically support the project of policy packaging in its broadest guise.

We proceed through two major sections. First, we outline what the key literature in the field considers to be the core *elements* of a policy package: primary measure(s); effectiveness measures, acceptability measures and feasibility measures. Second, drawing on theoretical advances made in recent literature, we explore potential means by which *processes* of policy packaging may be strengthened so as to ensure, insofar as is possible, that policy packages represent effective and efficient political interventions.

While its mechanisms may often be complex, the rationale for policy packaging is straightforward. Contemporary transport systems, in facilitating the movement of individuals and material goods, naturally confer many benefits to society. Yet, as is increasingly recognised, the same systems also generate and/or compound numerous social, environmental and economic problems that require various forms of political intervention in order to mitigate their harm or facilitate their contribution, and in a fair manner as possible (Banister, 2005). Furthermore, the vast majority of these problems are *multi-aspect* in nature (OECD, 2007). In other words, political interventions designed to mitigate their harm are rarely able to do so; rather, they must constantly recognise and respond in kind to problems' spatial and temporal complexity and ensure that they remain sufficiently flexible to address future risks and uncertainties. The salience of this complexity has clear implications for the design of political interventions; rarely can so-called 'messy' policy problems (Ney, 2009) be solved by simple solutions alone. In short, there are no so-called 'silver bullet' measures available for dealing with the multifaceted transportation challenges that Europe faces in the coming decades; an effective response requires concerted and coordinated action (OECD, 2008).

Importantly, the validity of this principle is by no means restricted to the logic of integrating transport policy with other broad domains such as environmental management or energy policy (although this can prove highly advantageous). Rather, it remains highly relevant at the level of transport policy *per se*. That is to say, even for a single issue like urban traffic congestion, the 'optimal' policy response would almost certainly encompass a range of measures deployed in a coordinated fashion. As Feitelson (2003) observes, however, the processes by which policy measures are devised, proposed, implemented and evaluated are all too often *isolationist* in nature. That is to say, a lack of consideration is given to the potential synergetic and/or contradictory effects that individual measures may impose—directly or indirectly—upon each other. This is argued to be true of instances where one or more measures are imposed in tandem, and also where new measures are implemented in a political milieu without due consideration of measures already in existence.

In contrast to such isolationism, 'policy packaging' arguably represents a more holistic and enlightened approach to the formulation of political interventions. Through the calculated combination of individual policy measures, made possible following a concerted exploration of their interrelationships, policy packaging seeks to maximise both the effectiveness and tolerability of political interventions in the transport system. The reason for this is fairly logical, as May and Roberts (1995, p. 98) contend: "there is benefit to be gained from an integrated approach, when compared with the piecemeal implementation of individual measures... [as this yields] a higher performance against the objectives of the strategy than could be achieved by the individual measures on their own." Packaging measures together in this manner, argue Banister *et al*. (2000), is vital for fulfilling policy objectives in politically acceptable ways and for ensuring the viability of fundamental shifts in policy direction within the foreseeable future. Indeed, as the OECD (2008) note, if done well, policy packaging can represent an ideal approach to designing *effective and efficient* political interventions.

The OECD's (2008) caveat 'if done well', however, is a valuable and pertinent observation. Given the limited material, evidence available as to their success, policy packages should not be construed as a panacea to the complexities and challenges of policy-making in their own right. In other words, while the rationale for policy packaging stems largely from the 'silver bullet' fallacy, there is a danger that packages may themselves be tacitly and mistakenly revered in the same regard. As will become evident through the course of this chapter, policy packaging is a complex and multifaceted process and, as such, plenty of opportunities exist for the occurrence of practices and decisions leading to non-optimal outcomes. It is for precisely this reason, therefore, that the OPTIC project is concerned with examining and improving the means by which packages come to be developed.

In Appendix 7.3 we review the presence of policy packaging in the context of nine EU-funded transport research projects from the 4th, 5th and 6th Framework Programmes. It can be seen from the conclusions drawn within the different EU projects that policy packaging is considered to be a promising approach to deal with conflict of interests which may arise during the policy making process. In some projects recommendations are given on how to approach the process of policy making and, to a lesser extent, policy packaging. However, due to the complexity of the policy making process and the context related challenges, no single solution to policy making and even less policy packaging can be forthcoming. Nevertheless, certain prerequisites that were identified can increase the likelihood of success, and these generally pertain to: the involvement of all actors in a broad decision making process; the use of appropriate models but not as a substitute for a decision making process; consideration of all relevant areas which are affected by transport policy; allowing for adjustments during the implementation phase; having a clear definition of expected policy outcomes; consideration of possible interactions between different measures; examination of measure acceptability for different groups involved; consideration of possible barriers for the implementation of policies. None of the projects reviewed, however, have engaged adequately with the issues of non-intentional effects raised in Chapter 3.

In this chapter, we build on and include the many elements of policy packaging indentified in past EU projects. We aim to propose a more coherent and structured framework for policy packaging which may help address current problems and challenges in the transport system.

4.2 Policy packaging: core elements

This section introduces some of the main conceptual themes and high-level approaches underpinning the notion of policy packaging. This comes in advance of Section 4.3 which extends our analysis to the procedural level. Here we outline what are generally considered to represent the core elements of a policy package: primary measures; effectiveness measures, acceptability measures and feasibility measures (as shown in Figure 4.1). All these should be considered—but not necessarily included—in a package.

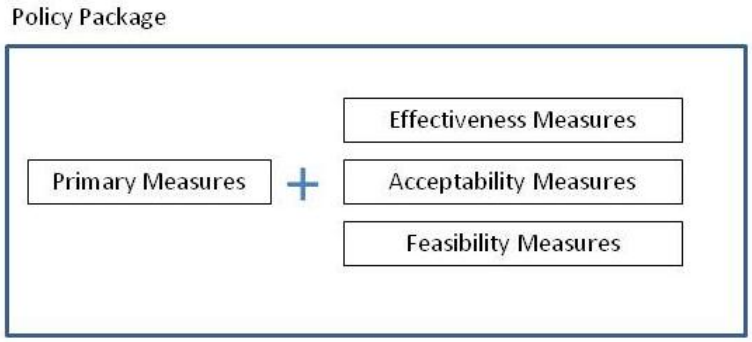

Figure 4.1 The main building blocks of a policy package

It is important at this early stage to first consider what can be said to genuinely constitute a package. The verb, to '*package*', in the sense in which it is used in this context, has been defined by the Oxford English Dictionary (1989) as: "to put together as a single unit." Naturally, this implies that a noteworthy degree of rationality is present, insofar as a 'packager' would use their faculties of reason, manifest through various methods of analysis or planning, to assemble individual policy measures in a calculated and deliberate manner (*ibid*.). For the purposes of the OPTIC project, we define a policy package as follows:

A 'policy package' is a combination of individual policy measures, aimed at addressing one or more policy goals. The package is created in order to improve the impacts of the individual policy measures, minimise possible negative side effects, and/or facilitate measures' implementation and acceptability.

Here we thus distinguish our approach from assemblages of individual policy measures that exhibit coincidental spatial and temporal co-presence as the result of other political or societal processes. Indeed, the OECD (2008) note that, to date, the majority of what may appear to be 'policy packages' are actually the product of myriad *ad hoc* decisions taken in relative isolation of one another, and often resulting from fluctuating and pressing short-term political imperatives. Thus, while several measures may be implemented in the same spatial and temporal context, it would be wrong to consider these to be *bona fide* policy packages in the sense used in the OPTIC definition as they have not been developed in a "fully articulated and coherent manner" (*ibid*., p. 435).

Also, it is important to make some observations with regard to the use of the term 'integration' in the existing literature. This term is, of course, widely used within the international transport policy community. As a result, it is perhaps not surprising that it is regularly used to refer to a number of related, but nevertheless conceptually distinct, processes. Here, we do not attempt to undertake a wide-ranging review of such usage, nor do we advocate our own taxonomy. Rather, we seek to acknowledge this heterogeneity of meaning, and to clarify its place in the discussion of policy packaging. May and Roberts (1995, p. 97), for example, recognise the similarities in the strategic usage of the terms

'integrated', 'balanced' and 'package' in the 'transport' field during the early 1990s, viewing each as implying: "the combination, or integration, of measures into a package which is balanced in its treatment of modes, areas or groups of users" (*ibid*.). Significantly, though, this is qualitatively different from 'integration' in the sense of physical intermodal integration or integrated (transport) policy (e.g. Givoni and Banister, 2010). Although the former is likely to appear as a goal in most policy packaging and the latter is probably necessary for many policies to be effective.

This is also relevant to the discussion of what constitutes a package as discussed above. For May and Roberts (1995) 'integration' in the context of policy packaging pertains to the strategic interaction of different policy measures. Hypothetically, for example, such strategic integration would refer to the genuine integration of a bus and rail service, or the co-implementation of traffic calming and traffic management measures. In contrast, the inclusion of a pedestrian crossing in a traffic calming scheme does not represent strategic integration in this sense. Four 'types' of integration that materialised in this strategic context can be highlighted:

- First, integration can refer to integration between different government authorities and jurisdictional scales;[1]
- Second, integration can refer to measures involving different transport modes;
- Third, integration can refer to the coordinated implementation of infrastructure, management and pricing measures;
- Finally, it can refer to integration between transport and other policy domains, such as healthcare or education (*ibid*.). Typically, this final form is discussed in the context of spatial planning; however, it is increasingly evident that healthcare, energy and education policy can exhibit significant interrelationships with transport policy (see, for example, Woodcock *et al*., 2007).

4.2.1 'Primary measure(s)'

Based on their work on the EU FP4 POSSUM project (see appendix 7.3), Banister *et al*. (2000) note that the process of designing a policy package is necessarily iterative and creative; policy-making clearly does not take place in a socio-cultural vacuum, and hence one cannot hope to create a viable package on the basis of formal procedure alone. Nevertheless, it is invariably acknowledged that the likelihood of developing a coherent, internally consistent and implementable policy package without recourse to some form of strategic process or framework is slim (*ibid*.; Feitelson, 2003).

A common point of departure in the construction of policy packages is thus the identification of a primary policy measure—or measures—that respond in an effective and direct manner to some given externality or policy objective(s). As will be discussed, it is to such primary measure(s) that further policy measures are added, in order to fulfil the various criteria by which a policy package may be considered viable. In the interest of conceptual clarity, this chapter uses the term 'primary measure(s)' in preference to 'starter package' (Banister *et al*., 2000), or 'base package' (Feitelson, 2003), as this aids the intelligibility of forthcoming sections.

Naturally, decisions taken as to which primary measure(s) to adopt in order to combat a particular transport problem will be highly contingent upon the precise social, economic and political contexts in which the intervention is being both designed and implemented (Feitelson, 2003). This said, generic guidance remains useful for ensuring due consideration

[1] However, as Ney (2009) points out, this sphere should be broadened to encompass the heterogeneity of NGOs that comprise contemporary 'polity' networks.

is given to prominent concerns which are broadly applicable regardless of local specificities. In light of this, Banister *et al*. (2000) identify four key principles for policy-makers to bear in mind when deciding which policy measures should represent the core of any package:

- First, the primary measure(s) should be, as far as is feasibly possible, uncontroversial, as this automatically serves to reduce the need for acceptability amendments later in the process. However, in practice, there may well be an inverse correlation between the extent to which a measure is effective and the extent to which it is likely to be acceptable.

- Second, it is argued that those measures which are likely to make vital contributions to an intervention's overall effectiveness, but which require a long lead time before results appear (such as land use measures), should be implemented early on in the process.

- Similarly, the third principle advocates immediate implementation for measures that are likely to act as trigger mechanisms for 'dynamic processes', which can be considered as those measures that initiate desirable positive feedback in the transport system; for example, encouraging telecommuting from the suburbs may reduce travel and encourages a significant proportion of the relevant population to engage to a greater extent with the local suburban economy. In turn, a vibrant suburban economy may attract those on the cusp of telecommuting to do so, thus reducing the demand for travel. Thus, the second and third principles relate to the timing of implementation and their effects (see also Section 4.3.2 on increasing package feasibility).

- Fourth, it is argued that the primary measure(s) chosen should include those that afford a degree of adaptability over time, in contrast to measures which are likely to lead to 'lock-in' solutions. This is an important consideration; as the future is uncertain, retaining a degree of flexibility in policy formulation is vital in order to enact remedial action and/or to manipulate the package in light of changed circumstances. This issue will be explored further in Section 4.3 in relation to the potential mitigation of unintended effects.

As Banister *et al*. (2000) stress, however, while it may be desirable for an individual measure to fulfil all of these four principles, this is unlikely to occur in practice. Notwithstanding the compatibility issues explored in Section 4.3, they thus advocate inclusion in the first instance providing that a primary measure fulfils the first principle and one or more of the remaining three. Moreover, while this initial phase may seem relatively straightforward, other authors have noted that rigorous appraisal of existing policy measures can be severely hampered by a lack of available data concerning their effectiveness (Feitelson, 2003; May *et al*., 2005a, 2005b).

4.2.2 'Additional measure(s)'

Once the primary measure(s) have been identified and their likely impact has been evaluated, there may be a need for policy-makers to incorporate additional measures so as to enhance both the effectiveness and efficiency of the proposed intervention—thus creating a *bona fide* 'package'. The existing literature highlights the fact that understanding and marshalling these additional measures constitutes the central opportunities and challenges of policy packaging design. Given the wealth of potential measures available, it is likely that a high number of potentially synergetic and contradictory relationships will be present, with each demanding careful consideration and appraisal. Indeed, as Holvad (2005) notes, policy

packages designed to mitigate certain transport-related externalities ought not to be solely comprised of transport-specific measures alone; related policy measures in domains such as healthcare, education, land use and environment are likely to warrant inclusion to varying degrees. Furthermore, those transport measures which are present will pertain to a variety of transport modes, requiring the application of integrated approaches in the sense of genuine inter-modal accessibility (*ibid*.; Givoni and Banister, 2010). However, in practice policy packaging in transport rarely relates to other sectors and integration is usually not achieved (*ibid*.).

Most of the major contributions to the academic literature on policy packaging assert that such additional measures can be usefully categorised according to the role they are expected to perform within a policy package (e.g. Feitelson, 2003). While terminologies naturally differ, it is possible to trace three such roles which appear particularly significant—relating to the enhancement of packages' effectiveness, acceptability and feasibility. Importantly, the latter two roles also strongly relate to the overall *efficiency* of a package, insofar as additional measures may alleviate (or potentially exacerbate) the costs of overcoming barriers associated with socio-political acceptability and/or economic feasibility.[2] This issue will be explored in greater detail in Section 4.3.

Increasing Package Effectiveness

The 'effect' that an intervention has on a policy target can be defined in terms of the former's "operative influence" on the latter; and hence 'effectiveness' can be defined in terms of the magnitude of this operative influence.[3] In the context of the OPTIC project, an 'effective' policy package would thus be one that exhibits a degree of influence on a policy target to such an extent that it is capable of manipulating it in an expedient manner. It is vital to keep in mind that here we conceive of effectiveness as a continuum, whereby packages are comparable according to the degree of their operative influence.

In their report *Instrument Mixes for Environmental Policy*, the OECD (2007) offer valuable insights into the high-level approaches that can be used to increase the effectiveness of policy packages. Of particular interest here is the emphasis they place on ensuring that policy-makers have a sound understanding of the nature of the particular problem/externality that they are attempting to ameliorate or mitigate. At first glance, this seems like an obvious point to make. However, as will be discussed in Section 4.3, attaining sufficient knowledge of the numerous causal mechanisms present in a policy scenario can be extraordinarily complex.

For the OECD (2007), a key part of this understanding is to determine whether the problem is most appropriately characterised as 'multi-' or 'single-' aspect.[4] Single-aspect problems are rare; an example given is the total emission of a harmful pollutant into the atmosphere. In this case, the problem is 'single-aspect' because it possesses only one element of significance (i.e. it is only the total amount of CFCs in the atmosphere that is of concern, regardless of where and/or when the CFCs are emitted). Multi-aspect problems are those where these additional dimensions are of concern and are more common. A transport example is offered here, specifically that of aircraft noise. In this example, it is not simply

[2] This chosen structure of analysis follows Feitelson (2003), insofar as it maintains a broad perspective with respect to the net value of a policy package. Specifically, this value is argued to simply be a product of effectiveness (benefit maximisation) and efficiency (benefit/cost ratio). Issues concerning the 'acceptability' and 'feasibility' costs of a package thus pertain to both categories.

[3] This is consistent with the definitional guidance contained in the Oxford English Dictionary (1989).

[4] This is qualitatively different from Feitelson's (2003) 'single- and 'multiple-target' terminology discussed in later sections, as it relates specifically to the problem at hand, and only indirectly to the design of a policy package.

enough to address the *total* amount of noise generated by aircraft, but rather the concern is further directed to understanding and appreciating *where*, *when*, and *how* the noise impacts are most acute.

Following Lipsey and Lancaster (1956), the OECD (2007) thus argue that in the case of multi-aspect problems, additional effectiveness measures should be deployed for each failure present in the market. Importantly, this relates to both the broad meta-failures which instigate the main policy objectives, but also the sub-failures which somehow further undermine the mitigation capability of the primary measures. Thus in the context of environmental policy, one measure would be needed to address the meta-failure *per se* (e.g. a carbon tax) and further measures would need to be deployed in order to support the effectiveness of the carbon tax; for example, labelling regulations designed to address the lack of information available to consumers as to the carbon emissions of motor vehicles.

Much of the literature on package effectiveness has approached this issue in terms of 'synergy', which can be defined as the "increased effectiveness...produced as a result of combined action or co-operation" (OED, 1989). Synergetic relationships are considered to exist in a policy package where individual measures mutually underpin one another. As demonstrated in the above example, this can be particularly important where failures exist in the markets in which the primary measure is operating, thus an additional measure can help to overcome these failures (e.g. a lack of information) and thus make the primary measure more effective than it otherwise would have been (OECD, 2007). As will become evident from this chapter, however, packaging must proceed in a cautious and analytical manner, with a considered evaluation of additional measures' marginal costs and benefits.

While the effectiveness of a primary measure may thus be increased through the provision of additional measures *per se*, the nature of such additional measures is similarly worthy of attention. Specifically, the OECD (2007) argues that policy packages should address a given set of problems/externalities in as broad a manner as possible. Often, this means regulatory measures should be applied in addition to market-based measures as they are better able to address the manner in which externalities are caused rather than simply targeting the total magnitude of the externality. In terms of emissions from transport, the OECD thus recognises the limitations of market-based measures and highlights the need for targeted regulation. However, it is also stressed that regulation is often better directed at emissions themselves rather than those which effectively promote fuel-efficient technologies. For example, subsidies directed at hybrid vehicle technology may inadvertently result in larger hybrid vehicle engines rather than any absolute reduction in emissions, a clear non-intentional effect. Importantly, packages must be designed in such a way that they remain flexible enough to allow those impacted to meet targets in a variety of ways, thereby enabling positive innovation. It is argued that there is a need for policy packages to give consistent short-term and long-term signals in order to support private investment decisions (*ibid*.).

Increasing Package Acceptability

Naturally, the profession of policy-making rests upon the valid assumption that policy measures and packages, to various degrees, are able to influence firms' and the public's behaviour. The most successful political interventions can also be *formative*, in the sense that they not only succeed in influencing behaviour, but manage to influence attitudes with regard to a particular issue (e.g. UK drink-driving or anti-smoking laws). It is generally acknowledged, however, that the exact characteristics of a potential political intervention are highly contingent upon the degree to which it is considered acceptable by a range of actors, often with competing interests.

For this reason, therefore, additional measures may help to make a primary measure(s) more socially and/or politically acceptable—providing they are implemented in full awareness of the political and institutional context into which the proposed package is to be deployed (Feitelson, 2003). Indeed, a well-formulated additional measure that somehow serves to placate strong opposition to an otherwise effective measure has the potential to significantly reduce the transaction costs associated with the overall intervention (*ibid*.).[5]

More recent work by the OECD (2008) furthers this line of reasoning to suggest that such additional measures may serve to increase the acceptability of a policy package through effectively penalising a known 'bad' rather than effectively subsidising an assumed 'good'. That is to say, 'bads' are generally known (i.e. there is a demonstrable causal relationship between fossil fuel combustion and CO_2 emission), whereas today's 'goods' (e.g. electric vehicles) may be later shown to be inefficient or ineffective by some other criteria. Furthermore, and as noted in the previous section, the OECD (2007) argue that in order to maximise the potential for synergetic relationships between measures it is important to select measures for the policy package that afford a high degree of flexibility to those stakeholders that will be affected. Thus, it is thought to be more advantageous—and more politically/socially acceptable—to initiate measures which allow for a degree of freedom and innovative response from affected actors. The OECD (2007) imply that this is more likely to be the case for market-based measures, but stress that this can also be achieved using certain forms of regulatory measures.

Increasing Package Feasibility

If policy packages are to be effective in meeting their targets, they must have an inbuilt sensitivity to complexity, and the ability to address policy targets with a battery of spatially- and temporally-differentiated measures. The previous section touched on issues of implementation as they relate to social and political acceptability. However, the challenges facing policy-makers with regard to implementation extend far beyond attitudinal obstacles.

The element of temporality here is particularly significant. As noted previously, Banister *et al*. (2000) highlight this in their appraisal of available policy measures, classifying each according to whether its effectual timescale is short-, medium-, or long-term. Essentially, this represents the time taken for the relevant actors (e.g. motorists) to react to the measure (Feitelson, 2003). Depending on the nature of the measure, this period may be almost instantaneous (e.g. the response to new parking restrictions) or it may be more gradual. An excellent example of the latter is provided by Duffy (2008), where he sets out a vision for urban sustainability founded upon a series of long-term measures designed to alter the characteristics of urban workspace provision. Duffy's work further illustrates the importance of including non-transport measures in transport-orientated policy packages.

In addition to this 'effectual' timescale, however, Feitelson (2003) suggests that attention should also be directed to two further timescales: measures' 'enacting' time, and their 'implementation' time. Enacting time is argued to be a function of the prior processes upon which the implementation of a particular measure is conditional. This can also be considered a proxy for transaction costs mentioned previously. Such processes may be administrative, technical or, as in the case of regulatory measures, they may be legislative (see also OECD, 2007). Legislative processes are liable to extend the enacting time considerably, and have

[5] Formally, transaction costs can be defined as 'the costs of deciding, planning, arranging and negotiating the action to be taken and the terms of exchange when two or more parties do business; the costs of changing plans, renegotiating terms, and resolving disputes as changing circumstances require; and the costs of ensuring that parties perform as agreed' (Milgrom and Roberts, 1990, p. 60).

strong parallels with the issues raised previously with regard to social and political acceptability. Implementation time, in turn, refers to the time between a decision to deploy a measure and its eventual execution. If the measure requires the construction of infrastructure and/or acquisition of capital goods this can be considerable. Once again, however, the impetus for execution will depend on the political context (e.g. the pressure for infrastructural development in view of the London 2012 Olympic Games). Thus, it might be necessary to include measures in the package which serve to meet similar targets that have a different, shorter, enacting time and/or implementation time in order to compensate for the long enacting and/or implementation time of the measures already included in the package.

Broadly, there are two spatial issues that require consideration in policy package design. The first relates to the scale of the policy target in question. Specifically, it is important to ensure that this is compatible with the spatial scale of the policy measures deployed. Thus if a policy target is confined to geographically bounded area (e.g. congestion in central London), a policy measure with wider national consequences (e.g. fuel tax duty) should not be included. The second issue of significance here, as touched upon earlier, relates to jurisdictional issues. The breadth of a policy target, and *ergo*, its attendant policy package, may well entail that a multiplicity of actors, operating at a range of spatial scales, from the supranational to the local, are to be involved (Feitelson, 2003). Such agencies may be of two types: those with direct responsibilities for the management of the transport system (e.g. a UK county council/ Department for Transport); and those without direct responsibilities, which, nevertheless, can impact significantly on the transport system indirectly via their operation (e.g. national treasuries) (*ibid*.). May and Roberts (1995) also note the significance of the fact that the vast majority of potential measures in a policy package can be deployed at different spatial scales and at a wide range of intensities. In the case of road pricing, for example, policy-makers can opt to implement the measure in a small, targeted zone or across a whole city. Measures outside the jurisdiction of those putting together the policy package are not only likely to have long enacting time, they might not be possible to implement at all and therefore should be excluded from the package on these grounds.

4.3 The process of policy packaging

In this section, we build on the 'core elements' discussed above, but broaden our focus to encompass the important *procedural* elements of policy packaging. We thus examine some of the key considerations and decisions involved in the development of effective and efficient interventions. While such processes are vital to the success of policy packaging, our intention here is not to prescribe a singular 'finalised' method for policy packaging. Rather, we aim to develop a framework for policy packaging that forms a sound conceptual basis for later OPTIC work packages and more generally for the purposes of formulating transport policies. Specifically, this initial framework is intended to support the following five concerns:

- The effectiveness of political interventions in the transport system (with respect to meeting the targets and objectives set);
- The efficiency of political interventions in the transport system (with respect to inter-measure interactions);
- The efficiency of political interventions in the transport system (with respect to social and political acceptability);
- The efficiency of political interventions in the transport system (with respect to technical and economic feasibility);
- The *ex-ante* prevention and *ex-post* mitigation of non-intentional effects.

The framework itself is comprised the following four phases (Figure 4.2):

PHASE 1 – ‘Determination of values, objectives and targets’
PHASE 2 – ‘Inventory of measures, provisional measures and causal assumptions’
PHASE 3A – ‘Evaluation: effectiveness and efficiency’
PHASE 3B – ‘Evaluation: prevention and mitigation of non-intentional effects’
PHASE 4 – ‘Additional measures and inter-measure interaction’

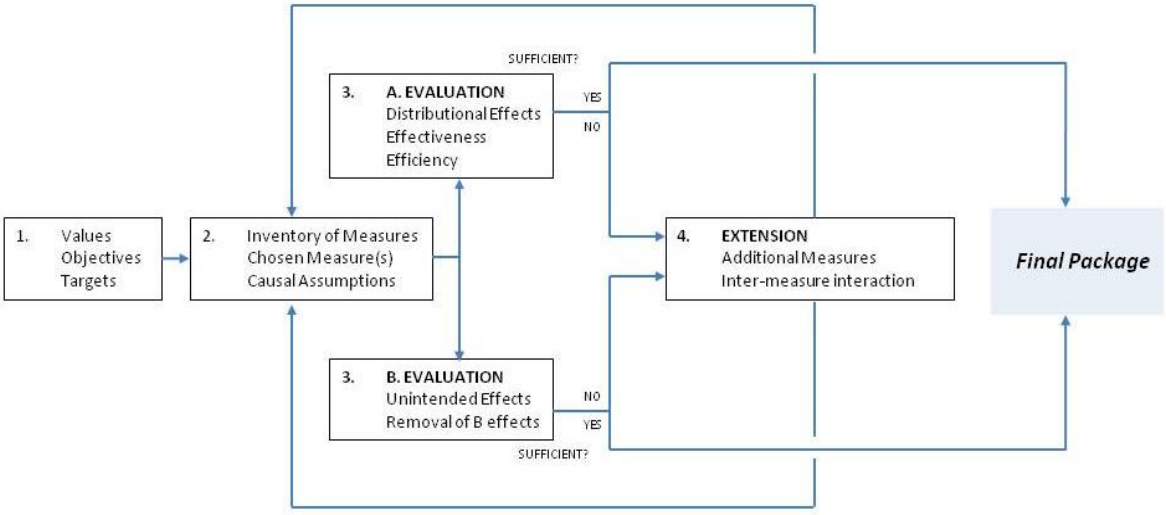

Figure 4.2 General phases in the policy packaging process

For ease of intelligibility, these will be discussed in the order shown above. However, emphasis is placed throughout on the framework’s iterative nature, so it should not be viewed as necessarily chronological. It is important to stress here that many of the caveats mentioned in Chapter 3’s discussion of non-intentional effects are also relevant in this section. In particular, it should be noted that the framework is highly stylised. Nevertheless, the framework has been developed in such a manner as to communicate the main procedural elements of policy packaging, rather than seeking to be ontologically correct.

4.3.1 Objectives, measures and causality (Phases 1 and 2)

The **first phase** of the framework—termed ‘determination of values, objectives and targets’—initially involves the designation of particular phenomena as ‘undesirable’ in the light of various ethical, moral or utilitarian value systems and world-views. Subsequently, political objectives are democratically agreed upon in relation to these phenomena, and specific (often numerous) targets are identified in order to realise the objective(s) (See Table 4.1).[6] As Feitelson (2009) reminds us, this will invariably involve the presence of competing values and world-views as well as markedly divergent perceptions of ‘reality’—characteristic of so-called ‘wicked’ (Rittel and Webber, 1973) or ‘messy’ (Ney, 2009) policy problems.

[6] Such objectives may be considered akin to those outlined in the UK Department for Transport’s New Approach to Appraisal framework, for example: ‘reducing the direct and indirect impacts of transport facilities on the environment’ or ‘improving the economic efficiency of transport’ (DETR, 1998).

Table 4.1 Example of a 'value statement', 'objective' and targets in transport policy making

Value statement	*'the current transport system should not compromise the well-being of future generations'*
Democratically-agreed objective	*'we intend to significantly reduce carbon dioxide emissions from passenger transport in the EU'*
Identified target(s)	***'we will improve the fuel efficiency of the motor vehicle fleet'*** ***'we will make it easier for people to walk and to cycle'*** ***'we will reduce the cost of public transport'***

Clearly, the democratic nature of this phase necessitates the participation of a broad range of actors and stakeholders, including politicians, citizens, policy-makers, NGOs and commercial interests. The role for policy analysts is thus less clearly defined here than in later phases. Nevertheless, expert knowledge is a valuable resource, especially when one considers that the quality of early decision-making can have significant implications further along the policy-development process. Importantly, analysts have a lead role to play in ensuring that early decisions are sensitive to the objectives and targets of overlapping policy domains (e.g. healthcare). As will be explored in Section 4.3.3, this has the potential to reduce the likelihood of certain non-intentional effects.

The **second phase** of the framework—termed 'inventory of measures, provisional measures and causal assumptions'—is comprised of three stages. First, an inventory of potential primary measures is created. This is intended to be an open and liberal process, with potential measures rarely being rejected outright at this point. The inventory could be comprised of a diverse array of measures, including novel or innovative ideas as well as so-called 'best practices' derived from other spatial/temporal contexts. Although by no means exhaustive, the sample transport policy measures discussed in Chapter 2 is illustrative of such inventory. May and Roberts (1995), too, offer a similar catalogue grouped according to infrastructure measures, management measures, pricing measures and land use measures.

For Banister *et al*. (2000), four 'policy orientations' are pertinent to the development of an inventory of primary measures:[7]

- 'Lifestyle-oriented' policies, whereby the intention is to assist in engendering a societal shift towards 'post-material' lifestyles.

- 'Market-orientated' policies, such as fiscal reforms. However, as the authors stress, these measures tend to function best in socio-economic contexts where the principle of allocating goods and services through pricing mechanisms is broadly accepted (e.g. fuel taxation).

- 'Regulation-orientated' policies, which apply technical standards in the management of particular phenomena (e.g. specified speed limits or minimal zoning densities). Typically these are decreed by national and/or supra-national authorities rather than those with local or federal jurisdictions.

[7] Similar considerations are put forward by Feitelson et al. (2001) as: technological measures, traffic management, demand management, infrastructural measures, land use measures, regulatory measures and economic measures. Both sets of authors, however, recognise that in practice these categories are by no means mutually exclusive.

- ‘Public infrastructure/ services’ policies, corresponding to the provision of infrastructural and/or public transport services. In practice, these are often likely to be contracted out under competitive tendering to private sector operators (e.g. the Parisian Vélib cycle hire scheme).

Second, this inventory is subjected to expert review and one or two primary measure(s) are selected on the basis of key criteria outlined by Banister *et al*. (2000) and discussed in Section 4.2.1. Are there, for example, measures available that are relatively uncontroversial, yet remain adaptable or have the potential to act as trigger mechanisms? Have some measures been proven to work in the recent past or in similar geographical contexts? Is there a measure which is likely to have the backing of particularly influential actors?

Third, the causal assumptions underpinning this selection are codified using a ‘causal map’. This final stage is intended to illustrate the direct and indirect processes by which the actors believe the chosen primary measure(s) will influence the various policy target(s). As Figure 4.3 demonstrates, such ‘causal mapping’ (Huff, 1990) is generally designed to support the codification and dissemination of tacitly-held causal knowledge and assumptions. In other words, it is essentially a diagrammatic representation of knowledge, or “a form of visual aid to enhance our understanding of the thoughts of an individual, group or organisation” (Pinch *et al*., 2010, p. 377).

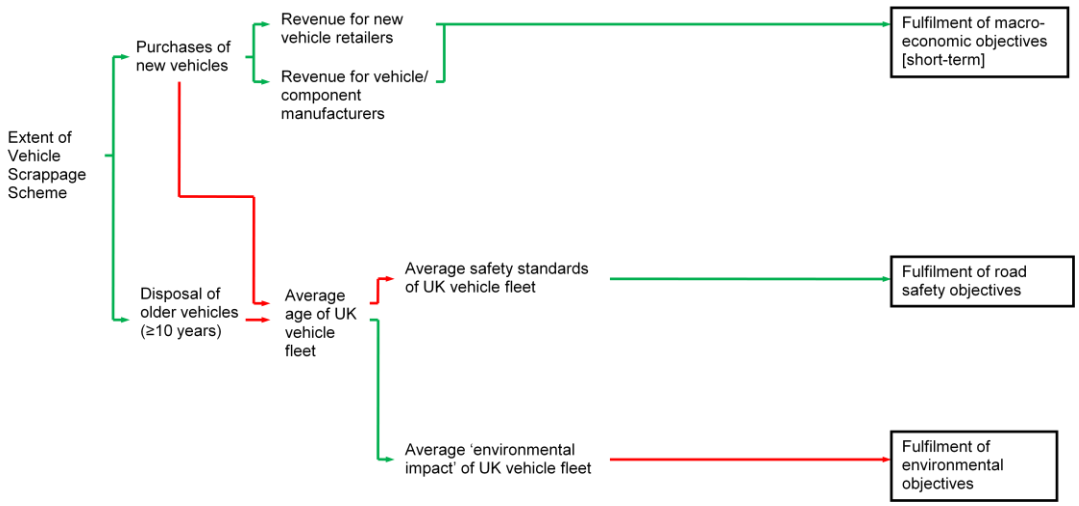

Figure 4.3 The principle causal assumptions underpinning the UK Vehicle Scrappage Scheme

4.3.2 Evaluation of effectiveness and efficiency (Phase 3a)

Phase 3a of the framework—termed ‘evaluation: effectiveness and efficiency’—is comprised of two stages, with each drawing heavily on the causal map produced in Phase 2. First, the likely distributional effects of the primary measure(s) are considered and evaluated. The intention here is to determine—insofar as is possible—the likely effectiveness and acceptability of the intervention in its original guise.

There is a clearly a need here to discuss the place of modelling and quantitative analysis in the framework. Modelling, in its broadest sense, refers to the simplified representation of

complex phenomena and it offers numerous advantages in decision-making processes. A major component of the proposed policy packaging framework outlined in this deliverable has been a form of qualitative modelling—causal mapping. This technique has been chosen to play a key role in the framework because it has the capacity to collate, structure and present intuitive information in a manner which supports effective and transparent decision-making. For all its merits, however, it is clear that such causal mapping needs to be complemented with input from robust quantitative modelling tools if decision-makers are to be able to make important decisions with a sufficient degree of confidence. Computerised modelling tools can ably indicate the strength of cause-effect relationships, assist in the identification of critical paths within a proposed intervention and offer structural support to complex problems beyond the capabilities of the human mind (see Hensher and Button, 2000).

A key aspect of Work Package 3 in the OPTIC project is a critical review of existing modelling tools currently available to analysts in the transport sector. In particular, this forthcoming work will focus upon the extent to which these tools are capable of addressing phenomena central to interests of OPTIC, such as the presence of synergetic relationships between policy measures. Given the nature of the policy packaging framework discussed here, however, it is possible at this early stage to highlight a number of important criteria which quantitative models used in Phase 3a of the process should ideally possess. First, and most obviously, it is necessary for models to support accurate prediction of agents' behavioural responses to a proposed intervention. Second, and very much related to this, they should be able to clearly indicate the likely impact of a proposed intervention on a *range* of societal groups. Finally, any modelling tools used must be compatible with the demands of mainstream evaluation methodologies such as cost-benefit analysis (CBA) and multi-criteria analysis (MCA). Both CBA and MCA are routinely used in the *ex-ante* evaluation of transport policies in order to maximise societal, environmental and economic welfare through transport, subject to the collective desire to allocate scarce resources to other policy objectives. Yet, while CBA and MCA are useful for decision-making in the context of specific schemes, they also potentially represent valuable tools for the appraisal of policy packages in a broader sense (Berechman, 2009).

While the integration of quantitative modelling in this phase of the policy packaging process is vital to ensure high-quality decision-making, it is important to bear in mind that such models only constitute one of many important elements in the proposed framework. Indeed, the principle rationale for the OPTIC project is founded upon the fact that existing approaches to transport policy-making suffer an inability to adequately address those phenomena—such as non-intentional effects and political acceptability—which tend to fall 'outside' of mainstream modelling approaches.[8] The role of modelling should, therefore, be that of a guidance tool in the framework. It can be incredibly valuable, but its inherent limitations mean that it should not solely determine the outcome of decision-making processes.

It is particularly necessary in this phase to consider which actors will be affected, how they will be affected, when they will be affected, and how much political capital these actors possess (Feitelson, 2009; Rietveld and Verhoef, 1998; OECD, 2007).[9] In a hypothetical policy intervention labelled 'liveable cities', for example, Banister *et al*. (2000, p. 182) identify

[8] Although it should be noted that some models can recognise those non-intentional effects, such as induced demand, which relate to pre-specified model variables.

[9] In addition to concerns of 'who', 'how' and 'when' in terms of distributional effects, one may be tempted to suggest further analysis of the variables 'why', 'what' and 'where'. However, these are essentially either deducible from the nature of the causal model (i.e. 'why' and 'what') or/and are subsumed under 'who' (i.e. where).

a series of stakeholder impacts likely to result from the various policy measures deployed. The primary beneficiaries of the measures were thought to be families with young children and the elderly, brought about principally by reduced car use in urban areas and a return to decentralised concentration land use planning. Those expected to be adversely affected, in contrast, were car drivers choosing to make rural-urban trips.

For Feitelson (2009), a systematic approach to the analysis of interventions' distributional effects involves a procedure termed 'actor assessment'. The value of such an approach is that it supports decision-makers and analysts in developing tailored strategies for coping with the varying interests, beliefs, positions and power held by affected stakeholders and so-called 'formal authorities'. The matrix below illustrates the basic approach, using the hypothetical example of a toll on road-freight (Table 4.2).

Table 4.2 A framework for 'actor assessment' (from Feitelson, 2009)

Actor	Interests	Beliefs	Position	Political resources
Hauliers	Profit	"Road hauliers are already in a difficult situation, this would damage our industry"	Anti	Medium
Consumers	Low prices	"Transport costs will be passed on to us"	Anti	Low (alternatively high as indirect effect of consumer behaviour)
Manufacturers	Profit	"Increased transport costs will further weaken our position vis a vis low cost regions (like Asia)"	Anti	High

Next, the knowledge of the intervention's likely effectiveness and acceptability—derived from the causal assumptions and distributional effects—can be appraised against estimates of the intervention's financial viability in order to determine—insofar as is possible—whether the current intervention is likely to represent good value for money. The financial viability of an intervention is essentially the sum of its associated direct, indirect and transaction costs (Feitelson, 2003). Direct costs can be classed as those which are outlaid for the measure to be sufficiently implemented. For example, the costs incurred as a result of providing the necessary infrastructure for a park and ride scheme. Importantly, these can often be mitigated or even offset altogether by revenue generated by the measure's own operation (i.e. park and ride fares) or by other measures co-deployed in an eventual policy package (e.g. congestion charging). Indirect costs may be considered as externalities incurred by society. Transaction costs may be considered as the cost of overcoming political and institutional barriers, as defined earlier.

At this point, it should be possible to come to an initial judgement as to whether the intervention is considered to be sufficient for purpose.

4.3.3 Prevention and mitigation of non-intentional effects (Phase 3b)

Phase 3b of the framework is termed 'prevention and mitigation of non-intentional effects', and can also be considered to represent an evaluative stage of the process. Traditionally, once a proposed intervention is considered to be an effective and efficient means of achieving a pre-specified policy objective, the policy development processes ends and implementation processes begin. This is understandable; however, the analyst's role does not cease at the moment a theoretically optimal intervention has been developed. It is also the responsibility of the analyst to conceptualise the problem in its fullest sense and to take into account the potential risks created by the presence of non-intentional effects.

First, we focus on the *ex-ante* prevention of non-intentional effects. Essentially, this involves minimising the *likelihood* of the intervention producing non-intentional effects and may necessitate a degree of package redesign in order to achieve this. In Chapter 3, we developed a typology of non-intentional effects founded upon two core dimensions: 'consequence and 'knowledge'. The typology is illustrated again below (Figure 4.3):

Table 4.3 Basic typology of non-intentional effects (adapted from Chapter 3)

		Consequence dimension		
		A. Expedient (~ intentional)	B. In-expedient	
			B1 Counter intentional	B2 Secondary
Knowledge dimension	W. known	The consequences that decision makers intended with the intervention ------- *Average fuel consumption of new vehicles is reduced; less fuel is consumed*	Counter-intentional effects that were anticipated at the time of decision ------- *Cars are driven longer distances due to lower fuel cost/km (rebound); models may predict the effect*	Non-intentional effects that were anticipated at the time of the decision ------- *Longer distances driven lead to increase in congestion, models may predict the effect*
	X. unknown	Advantageous effects not anticipated; serendipitous ------- *New cars inspire some people to 'green driving' lifestyles saving additional energy*	Counter-intentional effects not anticipated at the time of decision ------- *More people scrap old small cars leading to increased energy use for vehicle production and disposal*	Non-intentional effects not anticipated at the time of the decision ------- *Less public propensity to use alternative travel modes, leading to line closures*

From the typology, we can identify one category of intended effect (cell WA) – known and expedient (in primary policy domain, i.e. transport). This represents the desired and purposed effect(s) of the intervention. Providing that Phases 1 – 3a have been adequately performed, these should be clear at the outset of Phase 3b. We can also, however, identify five categories of non-intentional effect, corresponding to the following cells in Table 4.3:

WB1 – known and inexpedient (in primary policy domain [i.e. transport])
WB2 – known and inexpedient (in secondary policy domain [e.g. public health])
XA – unknown and expedient (in primary policy domain [i.e. transport])
XB1 – unknown and inexpedient (in primary policy domain [i.e. transport])
XB2 – unknown and inexpedient (in secondary policy domain [e.g. public health])

In order to ensure that the overall intervention is valuable and effective, it is vital to prevent any significant, adverse consequences that might result from the presence of such non-intentional effects. In light of this, our framework seeks to transform as many 'X effects' into 'W effects' as possible, and to 'design out' as many 'B effects' as possible. In other words, we wish to undertake two processes: improve analysts' *knowledge* of the proposed intervention; and improve the *effectiveness* of the proposed intervention. Evidently, both of these processes lie at the core of the packaging framework; however, in Phase 3b, they should take place on a much 'broader' scale so as to also encompass the likely impacts of the proposed intervention in overlapping policy domains.

Insofar as improving key actors' knowledge of the proposed intervention is concerned, we are aiming to ensure that the shared 'causal map' underpinning the policy package is as comprehensive as possible. That is to say, it should demonstrate detailed understanding of the intervention's core mechanisms and their relations with the context in which it is to be applied. While the causal map can never be wholly 'complete', we are thus basically attempting—in the first instance—to change XAs into WAs, XB1s into WB1s, and XB2s into WB2s, respectively. This is no straightforward task. Theoretically, however, achieving it involves improving both the 'quality' of available knowledge (through improved research), and minimising the 'distance' of this knowledge from the analysts' cognitive field.[10] Given that changing XB2s into WB2s involves overlapping policy domains, and thus as this 'distance' is likely to be greater, this process of knowledge-enhancement will be comparatively more difficult and resource intensive than for changing XB1s into WB1s. Practically, this knowledge-enhancement would involve detailed examination of the causal map in Phase 2, with analysts considering how each variable may directly or indirectly have an adverse effect on the policy target(s) and objective(s) in both the primary policy domain and secondary, overlapping, domains.

At this stage, once analysts' knowledge of the proposed intervention has been developed as far as possible, the (original and new) WB1s and WB2s may be considered to represent 'timely warnings'. That is to say, analysts are aware of their likely occurrence, but nevertheless such occurrences would remain *undesirable*. Using the improved knowledge of the situation, however, in conjunction with the packaging techniques to be outlined in Phase 4, it may be possible to reduce the likelihood of such occurrences through the removal of existing measures and/or the inclusion of additional measures. Theoretically, therefore, we can envisage a situation whereby current WB1s and WB2s are removed so as to enhance the contribution of WA1s and WA2s, respectively.[11]

In addition to *ex-ante* mitigation, Phase 3b also addresses the *ex-post* mitigation of non-intentional effects. Regardless of the resources and effort directed at their prevention, the presence of non-intentional effects can never be 'designed out' of an intervention. Indeed, the contemporary economic, societal and cultural process in which policy interventions are necessarily embedded, bear many of the hallmarks of so-called 'complex systems' (e.g. non-linear relationships, tipping points and path-dependencies). Thus, it is vital to

[10] See discussion of Landry *et al*.'s (2002) 'ladder of research utilisation' in Chapter 3.

[11] The current typology automatically defines WA in terms of WA1, and does not currently include a WA2 category. For the purposes of our argument, however, let us assume that such a category is present.

ensure—insofar as is feasibly possible—that if adverse, non-intentional effects do occur as the result of an intervention, the underlying policy packages are flexible enough to be changed in the light of such circumstances. This has important implications on the measure selection stage in Phase 2, and thus highlights the iterative nature of the framework. Measures requiring significant infrastructural developments, for example, can be difficult to modify, whereas pricing schemes afford greater adaptability to changing circumstances and flexible planning processes.

4.3.4 Additional measures and inter-measure interaction (Phase 4)

As accounted for in Figure 4.2 above, it is theoretically possible that the one or two primary measures selected in Phase 2—having been thoroughly evaluated in Phases 3a and 3b—could be considered as a sufficient intervention in their own right. That is to say, in such a situation there would be no need for analysts to engage in 'packaging' activities, *per se*. However, as noted in Chapter 2, the complexity of contemporary transportation problems is such that measures deployed in isolation will rarely suffice. In Phase 4, then, we are concerned with the manner in which analysts may modify the proposed intervention so as to improve its effectiveness, efficiency and/or limit its propensity to bring about non-intentional effects. Following Feitelson (2003), this may occur through the adoption of three strategies:

1) Measure removal

It may be advisable to reconsider the inclusion of certain primary measures that have proved particularly contentious with one or more stakeholder groups. In this situation, removing the measure and replacing it with another may improve the overall acceptability (and hence reduce the transaction costs) of the package dramatically. However, this is not an ideal situation, as, by virtue of its original inclusion, such a measure will inherently be beneficial in some way to either the effectiveness or technical/economic feasibility of the package (May *et al*. 2005a). Hence, the opportunity cost of its removal may be considerable with respect to the overall viability of the package.

2) Context manipulation

The second option for improving the effectiveness and/or efficiency of the primary measures lies not with the package *per se*, but the socio-political context in which it is being proposed. Specifically, it may be possible to modify this context—be it public opinion or otherwise—thereby facilitating the measure's inclusion. In practice, such an undertaking is likely to substantially increase the transaction costs and by definition imply the inclusion of additional measures to facilitate the modification of the unfavourable (for policy implementation and acceptability) socio-political context (see below).

3) Incorporation of additional measures

Finally, in the light of the causal map, distributional effects, financial viability of the primary measures and/or the likely presence of non-intentional effects, it may become evident that effectiveness and/or efficiency of the intervention might be improved through the incorporation of additional measures (i.e. the creation of a policy package). Perhaps barriers to acceptability are evident, for example, and additional measures may help to placate this opposition; or perhaps information failures are likely to exist and additional measures may help to increase the effectiveness of those primary measures that rely on a threshold degree of public knowledge. It may also be the case that non-intentional effects can already be foreseen and need to be addressed. Indeed, there can be many reasons which call for expansion of the package.

Essentially, this third strategy follows very much the logic of 'critical pragmatism' (Banister, 2003), whereby a balance is struck between the various interests held by relevant stakeholders implicated in the intervention. This strategy is thus framed in contrast to positivistic, instrumental approaches which conceptualise decision-making to exist in a social vacuum, with little or no consideration of public or stakeholder involvement, and 'consensus-seeking' approaches such as collaborative planning, which can undermine effective yet contentious policies.

As Banister *et al*. (2000) note, the process of selecting additional measures is liable to be both deductive and inductive; deductive, as it may draw on a preconceived vision of the future—as in the case of 'backcasting'—and inductive because it may allow for the development of policy packages based on the novel combination of potential measures hitherto deployed only in isolation. Moreover, the identification of such potential additional measures—which may have grown beyond those in the original inventory discussed in Phase 2—should, at this stage, be based on intuition, clear delineation of causal assumptions built on the earlier causal model, and professional expertise and experience, as more detailed evaluation of additional measures' impacts will take place later in the phase.

Indeed, May and Roberts (1995) offer a convincing rationale for not dismissing potential measures out of hand, as they may possess valuable attributes not immediately apparent. Like Feitelson (2003) and the OECD (2007), they highlight a number of core 'rejection criteria' that analysts may be tempted to employ during this phase:

- First, potential measures may be seen as *technically unfeasible*, as existing legislation may not be adequate to support them. Writing in the early 1990s, they interestingly use road pricing as an illustrative example of this.

- Second, a measure may fall under a different *jurisdictional scope* to that of the implementing body. Thus a fuel taxation measure could be seen as an inappropriate measure to include in a municipal authority's policy package as this falls under the prerogative of central government. This principle holds sway at all scales of governance, insofar as measures may fall 'above' or 'below' one's jurisdiction.

- Third, measures may be rejected on the grounds that *dispersal of responsibilities* has made it difficult to plan integrated strategies (e.g. integrated bus and rail ticketing following the privatisation).

- Fourth, some measures, for example, light rail, may be viewed as *prohibitively expensive* and thus rejected on grounds of resource constraint.

- Fifth, some measures may be viewed as *publically unacceptable* (e.g. traffic restraint).

- Finally, sixth, some measures demand *new and unproven technologies* and are thus rejected on the grounds of risk and uncertainty.

Given these multiple reasons for not incorporating measures into a package, May and Roberts (1995) argue, it would seem straightforward enough to create a package based on the handful of measures that are not, in some significant way, affected by one or more of these 'rejection criteria'. To do so, however, is to miss two important points. First, as policy packages are generally intended to be implemented over a medium to long timeframe—often two decades or more—one cannot be certain that the same constraints on implementation present at the outset will also be present in the medium to long-term future. Indeed, in the fifteen years since May and Roberts's (1995) paper was published, we have seen a number of prominent road pricing schemes adopted in capital cities across the world,

including Singapore, London and Stockholm (Santos, 2004).[12] Second, a central component of the rationale for policy packaging is the identification of those constraints which, upon reflection, appear far from ideal and should be removed. For example, if the nature of rail privatisation has reduced policy-makers' ability to enact comprehensive change, via the *dispersal of responsibilities* highlighted above, then this may, in part, constitute a valid reason for reviewing and potentially modifying the nature of the service provision. In essence, it is these 'rejection criteria' that act as the main rationale for expanding the package with additional measures in order to allow the inclusion of measures which otherwise will have to be rejected. Whether to expand or shrink the package is mainly a question of the marginal transaction costs and benefits. These additional measures, which might allow the inclusion of measures that otherwise will be rejected, might not be directly, or at all, related to any of the policy targets.

A central component of Phase 4 is the systematic analysis of what we have termed 'inter-measure interaction'. This process is concerned with establishing detailed knowledge of potential additional measures' likely relationships and, hence, examining the extent to which such measures may or may not, directly or indirectly, improve the quality of the proposed intervention. This is likely to be a highly complex process, as it requires detailed and considered appraisal of the nature and magnitude of the relationships between both the measures themselves, between the measures and the policy target(s)/objectives *and* between the measures and existing policies already in place. Indeed, it will be a challenge simply to achieve such an understanding of likely interactions in a conceptual sense; extending the analysis so as to provide definitive estimates of the magnitude and probabilities associated with each relationship will be harder still, but nevertheless desirable if possible at relatively low financial and time costs. Success in this phase will thus be strongly dependent upon the capabilities and accuracies of modelling—which later OPTIC work packages explicitly address.

How, then, to decide upon which policy measures to add to the starter package and which to omit in order to increase its overall effectiveness? The essential criteria by which a potential additional measure would warrant inclusion in the policy package relates to whether it is likely that the *total* marginal benefits (TMBs) resulting from its inclusion will outweigh the *total* marginal cost (TMCs) of its inclusion. Here, TMBs refer to the net positive effect of an additional measure on the effectiveness of the intervention, whereas TMCs represent the sum of the additional measure's associated financial and transactional costs. This distinction between *individual* marginal benefit and *total* marginal benefit is, of course, a vital one—precisely due to the presence of synergetic and/or contradictory effects. Essentially, the total marginal benefit represents the net effect an additional measure would have on the policy target. For example, if a road pricing scheme constituted the primary measure in an intervention designed to reduce congestion, the total marginal benefit resulting from the addition of a Park and Ride service would be the difference in congestion levels pre and post its addition. Establishing the marginal benefit of implementing the measure in isolation is thus of limited value, as such marginal benefit may well be either offset or augmented by the presence of other measures.

Following Taeihagh *et al*. (2009a, 2009b), it appears probable that two particular varieties of additional measures are likely to lead to net marginal benefits:

[12] Recent attempts to introduce road pricing in regional cities have, however, met with more hostility; for example, the UK cities of Manchester and Edinburgh.

1) Pre-conditional measures

These can be defined as measures, without the inclusion of which, one or more other measures will not function. In essence, such relationships represent critical paths in the causal map of the intervention. As such, measures to which other measures are act as a pre-condition to them are likely to have a high transaction costs and thus also financial costs, since they require the inclusion of the pre-condition measure.

2) Synergetic/facilitatory measures[13]

These can be defined as measures which support the functional ability of one or more other measures, although these other measures can still be implemented independently. The OECD (2007) suggest that there are at least five different purposes for synergetic relationships within any given policy package, those that: 'provide information', 'stimulate innovation', 'address split incentives', 'limit monitoring and enforcement costs', and 'reduce compliance cost uncertainty'. Earlier work by May and Roberts (1995), too, identifies three fundamental ways in which measures can be considered 'synergetic'. First, they can be complementary in terms of their *joint impact on users*. For example, in addition to road pricing, the London Congestion Charging scheme simultaneously allocated significant resources to improvements in the public transport network. The net effect of implementing two or more of these complementary measures in conjunction with one another, it is argued, is larger than that would otherwise be obtained if one merely combined the effects of each measure hypothetically deployed in isolation. Second, two or more measures can be complementary in the sense that one may make the other(s) more *financially feasible*. For example, fees generated by parking measures might in turn provide the financial capital necessary to fund the construction of new infrastructure. In extreme situations, these may constitute pre-conditional relationships. Third, measures may be complementary in the sense that one might make another more *socially or politically acceptable*. To return to a previous example, the fact that a substantial part of the revenue generated by the London congestion charge was earmarked for public transport improvements made the former more palatable to those affected (see also Jones, 1991).

Correspondingly, two particular varieties of additional measures are likely to lead to a net marginal cost:

2) Redundant measures

These can be defined as measures which make no effectual contribution to the policy package beyond that already provided by existing (primary or additional) measures. Simply put, this occurs where inclusion of an additional measure in a package will have little or no additional impact on the net benefit of the package beyond that which existed prior to its inclusion. Such redundancy clearly leads to unnecessary administrative costs and further entails that packages run the risk of becoming overly large and complex, at the expense of effectiveness, efficiency and flexibility (OECD, 2007). It is also advisable to refrain from incorporating additional objectives beyond those directly concerned with the problem/ externality in question. Thus in the case of a transport policy package, it may make more sense to address the bulk of non-transport objectives (e.g. social security), by other means (*ibid*.).

[13] Taeihagh *et al*. (2009) make a conceptual distinction between these two types. However, for our purposes we shall consider them to be synonymous.

2) Contradictory measures

These can be defined as measures that produce conflicting outcomes or incentives, which mean that they are 'at odds' with the purpose of other (primary or additional) measures. As Feitelson (2003) and the OECD (2008) both note, such contradictory relationships can particularly arise in situations where a policy package seeks to address more than one objective.[14] If, therefore, as may occur, the inclusion of an otherwise valuable additional measure serves to detract from one or more other measures and *ergo* on one or more other policy targets, then a broader decision-making approach must be pursued. Specifically, such a situation necessitates that one must establish both the extent of the measure's influence on the range of policy targets *and* the relative weight of importance attached to each of the policy targets (Feitelson, 2003). This latter consideration will again entail an assessment of the targets' distributional effects, and may be derived in conjunction with stakeholders via a form of Multi-Actor Multi-Criteria Analysis (MAMCA) (see, for example, Macharis *et al*., 2010).

Crucially, the new knowledge produced in Phase 4 must remain grounded in all of the concerns addressed in Phases 2, 3a and 3b. Hence, the framework is iterative in nature; provisional additional measures that are deemed to be potentially useful in Phase 4 must be incorporated into the intervention's overall causal map and, subsequently, the analysis undertaken in Phases 3a and 3b must be repeated in light of the new package structure. The policy packaging process ends when the package is deemed to be sufficient when appraised against *both* the criteria in Phase 3a (i.e. it is an effective and efficient means of meeting a policy objective) and Phase 3b (i.e. it affords the prevention and mitigation of non-intentional effects).

4.4 Conclusions

As noted in the introduction, policy packages offer a far greater potential for effectiveness than single policy measures deployed in isolation. To maximise this potential, however, substantial thought must be given to their design. OPTIC will require a framework that is able to specify: relevant package targets, package orientation, transport sub-sector(s) affected, and spatial/ temporal scales of action. Essentially the existing literature on the topic initially advocates building a package around one or more primary policy measures. To this starter package, supplementary measures may be added in order to improve the package's effectiveness, acceptability, and feasibility.

It is important to reiterate that policy packaging is not an exotic dalliance or some kind of luxury technique only to be applied in times of bountiful resources; rather we need to stress that, in the current political landscape, it should represent the *de facto* approach to policy-making. Even when resources are constrained to the extent that designing and implementing a large package of heterogeneous measures is prohibitively expensive, the value of policy packaging theory still remains highly relevant for evaluating the likely nature of the interactions between any new measures proposed and those existing 'in the field'.

[14] The OECD (2008) give the example of measures designed to support agricultural provision and those designed to tax nitrogen-loading fertilizers.

5 Summary and future work

This deliverable represents the conceptual foundation of the OPTIC project. In particular, it has sought to provide the theoretical resources necessary to develop our understanding of the complex causal processes involved in contemporary policy-making at the European level. Essentially, this concluding chapter has two complementary purposes; it is intended to provide a concise summary of the preceding chapters and, importantly, it is intended to situate the contributions that these chapters have made in the wider context of the OPTIC project and forthcoming work packages.

In Chapter 2, we firstly examined the nature of transport policies and processes of policy analysis in the European Union at both the supra-national and national scales. Attention was directed at a number of areas, including the principal institutional actors involved in agenda-setting and decision-making, together with an overview of some of the key instrumental mechanisms upon which political interventions in the transport system typically depend. Of particular significance was the range of overarching EU policy documents, collectively stating the main problems related to transport in the Union, the goals for the EU transport policy and favoured approaches to achieving these goals. We secondly complemented this with a broad overview of policy measures that have been implemented across a range of EU member states in recent years. This exercise demonstrated that non-intentional effects and barriers to successful implementation are frequent occurrences in such interventions, regardless of measures' specific objectives, types and geographical scales.

Recognising the complex and heterogeneous nature of the non-intentional effects highlighted in Chapter 2, and those documented elsewhere in the published literature, Chapter 3 sought to develop a systematic typology of such effects. As noted, the purpose of this exercise was not to establish a universally applicable taxonomy for all aspects of intentions and effects of transport policies, but rather to create a schema tailored to the specific needs of policy-makers and associated actors. As a result, the typology was concerned with establishing conceptual clarity, providing a useful categorisation of types of non-intentional policy effects and supporting the design of policy packages later discussed in Chapter 4. The final typology is extremely detailed and undertakes to analyse the nature of policy effects with respect to numerous variables. Nevertheless, the fundamental contribution of Chapter 3 is evident; it demonstrates the importance of actors' situational knowledge, the accuracy and breadth of their causal assumptions and the real and perceived range of their jurisdictional influence. Furthermore, and equally as important, it brings the issue of non-intentional effects to the fore; by acknowledging their existence, and by starting to define their characteristics, this analysis affords accounting for them in the early stages of policy design, thus reducing the need to take remedial action at a later date.

In Chapter 4, we sought to develop a framework for policy packaging with an in-built predisposition to the prevention and mitigation of non-intentional effects. Moreover, this prerogative was coupled with input from wider debate in the literature concerning the need for interventions in the transport system to be both effective and efficient. We stressed at the outset of the chapter that the proposed framework was not to be viewed as a prescription; nevertheless, in supporting the efforts of later work packages, we actively sought to converge on a set of interrelated principles that logically support the project of policy packaging in its broadest guise. Following a review of policy packaging developments in previous EU-funded transport research, four 'core elements' of a policy package were outlined in accordance with key academic and policy literature: primary measure(s); effectiveness measures, acceptability measures and feasibility measures. Attention was then directed to the procedural aspects of policy packaging, reiterating and building on the salient issues raised in the previous two chapters. Appendix 7.4 reports on the team's efforts to test the policy packaging framework in a workshop scenario.

Overall, the deliverable concludes that policy packages offer a far greater potential for achieving policy targets and objectives than single policy measures deployed in isolation.

Indeed, the nature of the objectives present in current EU policy requires such an approach. Yet, a careful and relatively well designed process (as described in Chapter 4) must be undertaken for these packages to be effective. Furthermore, we argue that policy-packaging as an approach to policy making should be adopted, certainly by the EU and also by other bodies involved in policy making at various spatial and institutional levels, as the *de facto* approach to (transport) policy-making. This approach probably provides the best way to reduce the extent of policies' *ex-post* non-intentional effects.

With the body of relevant knowledge gathered and built upon in Work Package 2, and described in this deliverable, Work Package 3 can now proceed to examine to what extent current state-of-the-art modelling and forecasting techniques can facilitate the identification, *ex-ante*, of non-intentional effects and thus contribute to their prevention and mitigation. Similarly, with the typology of non-intentional effects in mind, Work Package 3 will also examine ways in which unavoidable non-intentional effects can be identified as early as possible in the various phases of the policy package. Later in Work Package 3, alternative remedial actions in response to the non-intentional effects will be examined.

Simultaneously, efforts in Work Package 4 are being directed at examining various EU transport policy packages (defined according to the definition provided in Chapter 4) with the aim of identifying real-world 'best practice' examples of policy packaging techniques. As the research proceeds, the typology of non-intentional effects in combination with the framework for policy packaging will be revisited and modified in light of such experience, mainly by moving from a theoretical dimension to the empirical and applied dimension of policy making.

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7 Appendices

7.1 Inventory of policy measures

[Please see final pages in landscape format]

7.2 Disciplinary perspectives on non-intentional effects

In Chapter 3 policy effects have been introduced and categories with a special focus on non-intentional effects were proposed. The typology is intended to be general and not bound to by any particular scientific paradigm or theory. The potential advantage of this is that it may be applied without making particular assumptions inherited only from one research discipline. This is particularly appropriate a transport context, since transport policy is a highly interdisciplinary research topic.

Different research disciplines and theories can however be helpful to identify a range of potential explanations of *why* the unintended effects occur in the first place, what has presumably *caused* them, and thereby also how they could be potentially *dissolved* or *mitigated*. For example, an unintended effect of a vehicle fuel efficiency standard may be the rebound effect that makes driving cheaper and potentially induces other traffic at already congested roads. Economic analysis may allow to identify and predict this effect, based in models for elasticities of consumer response to price changes, and hence to consider possible compensatory measures in advance, if need be. This is a good example of the scientific reasoning: the theory points to a mechanism, that may *trigger* various non-intentional effects, rather than describing a specific *type* of effect itself as done in chapter 3. Again the combination of input for various disciplines can be relevant, taking into account the complexity of transport systems and their interactions with surrounding systems and policies.

In this appendix we provide a brief overview and some examples of theoretical concepts that can contribute to the understanding of why some unintended effects may occur. The concepts are mostly from economics and political science.

To set the scene Figure 1 very roughly illustrates elements in a potentially successful policy intervention with regard to how different research may contribute to identify different types of mechanisms that can cause non-intentional effects in connection with the intervention.

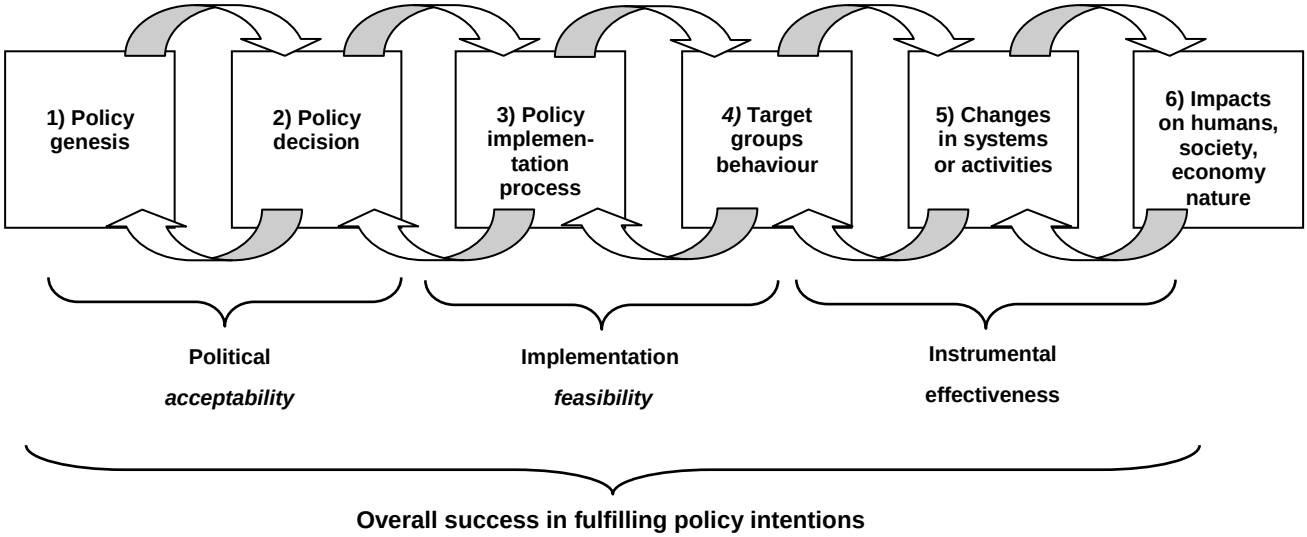

Figure 7.1 Steps in a transformation of a policy intention (formed in the policy's genesis) to its impacts on society, nature or other endpoints (intentional as well as non-intentional). Feed backs are assumed, but the illustration is deliberately simplified to illustrate the main points of this appendix.

We start in the right hand side where the emphasis is on what can be called the *Instrumental policy effectiveness*, or the effectiveness of the policy instruments themselves with regard to influencing the object of regulation (e.g. a behaviour, or a system) leading to the desired outcome of interest. This is similar to what Feitelson (2003) calls 'goal-oriented' measures'. Instrumental effectiveness of such measures has arguably been the main focus of policy making research in general (Bressers and Klok, 1988), not less so in transport research.

A wide variety of research contribute here. Natural sciences and engineering can for example help to assess policy effects based on theories, models and observations of how energy input is transformed to physical movement of vehicles or vessels, and how the transport flows interact in networks leading to effects on everything from capacity, to wear of surfaces, accident risks, human health and global environmental impact far from the source. Without such knowledge it would often be difficult to calibrate transport system interventions in way that would not produce numerous non-intentional effects (Leutzbach,1987; Litman, 2007; Health Service Scotland 2007,. Hakkert *et al*., 2007). Obviously human behaviour is also crucial for policy outcomes. Psychology, economics and other human and social sciences are therefore applied to predict for example elastic, or perhaps defective behavioural reactions among different groups of people targeted by an intervention. Thomson et al (2008) in an example of a wide interdisciplinary review of studies of unintended health effects of traffic, including ex post assessment of noise effects of a bypass, air quality related health impact of a ban on high sulphur fuels, health benefits of cycling, crime prevention effects of traffic surveillance, and stress effects of commuting by road or train.

However, according to Healy (1986), the instrumental research normally assumes "...that policy goals can be best attained by the manipulation of causal variables in the social environment (social engineering) and that the most efficient means of attaining these goals can be (scientifically) determined by an ends-means analysis (instrumental rationality) " (Healy 1986, p 383). Earlier stages in the transformation of policy intent to desirable outcomes have frequently been ignored or neglected as if they were more or less 'automatic', something that has increasingly been criticised (Bressers and Klok 1988; Topp 1995).

Hence research has moved backwards in the chain, realising that policy intentions do not transform to adequate interventions by themselves. Factors such as *policy implementation feasibility* (Winter 2003; Pressman & Wildavsky 1984) and before that *political acceptability* (Guiliano 1992) have come to the fore as factors that may produce disturbances to the successful realisation of policy intentions in additions to those associated with the instrumental effectiveness. A diverse range of social science disciplines and theories within them have been applied, including areas like institutional and behavioural economics and political.

Below some of the key relevant concepts of economic theory are reviewed followed by a brief account of some contributions from political science.

7.2.1 Economics

Economics provides a wider range of approaches to identify and understand possible unintended effects along several parts of Figure 7.1, ranging from the instrumental aspects to the implementation and acceptability related ones.

From an economic point of view, special concern is needed to effects in the impact end that are *externalities*, meaning that the consumption or production choices of one person or firm enters the utility or production function of another entity without that entity's permission or compensation (Kolstad, 2000). This can be both positive and negative, depending upon the nature of the transaction. A negative externality could be congestion caused by a driver choosing to travel during peak hour traffic, creating further congestion and thereby disutility for other drivers. Externalities, can indeed be interpreted as an economic perspective on non-intentional effects. According to theory, a well functioning market is the optimal mechanism to ensure efficient achievement of society's goals; an externality is thus an anomaly, which may detract from the optimal solution. The 'positive' externality could be equivalent to the 'overdone' measure, or the serendipitous effects discussed in chapter 3.

Increasing returns

Increasing returns can lead to externalities, positive or negative. Mohring (1972) provides a classical example based on data from urban bus transport in the Twin Cities metropolitan area in the United States. Here he finds first best arguments for subsidising the bus service. The argument rests upon the value of waiting time, and the headways between the busses. If, say the headway between the busses is reduced by half, the welfare effect is increased with more than a half as the service level is increased and the cost of waiting is reduced.

With economies of scale it is impossible to predict ex-ante the effect of the different market forces. There are possibilities of multiple equilibriums and is difficult to predict the outcome. Increasing returns can also cause the economy gradually to lock itself in to an outcome not necessarily superior to alternatives, not easily altered, and not entirely predictable in advance (Arthur, 1988).

The most important causes of increasing returns in the transport market are:

1. *Network externality*
2. *Supply externalities*
3. *Learning-by-doing*
4. *Economies of scale*
5. *Increasing returns to information*
6. *Technological linkages*

Transport systems, behaviour and complexity

Transport economics has extensively studied *target group behaviour* in terms of likely response to policy interventions such as changes in supply of transport, prices of transport or other market interventions (Small & Verhoef 2007; Burgess & Tavazzy 2004). However (in accordance with Richardson 2005, p 29), “each transportation system is complex, and this complexity derives from the pluralism of its hardware (infrastructure and vehicles) and of the people and organisations involved. The complexity is multiplied by the existence and roles of different modes, regulatory and legislative bodies, service providers, builders, financing systems, technologies, land-use patterns and most importantly human behaviour”.

Form an economic perspective this has serious consequences. Most economic thinking uses simplifications and models to understand the world. These models will capture the essence of the process and help us understand it, but in doing so things are left out. This does not need to be a serious issue, but it can be. The alternative to this simplification is a set of very complex dynamic models with many variables and different lags. This in turn might easily become a black box limiting, rather than helping our understanding of the processes involved. In other words, transport systems are difficult to model precisely. This is not only linked to the internal complexity of the system, but also to external factors, such as risk and spill over effects from other markets, feedback effects with different lags *etc*.

Transport policy implementation and acceptability

As already noted economic research also extends into implementation problems and acceptability in transport, the ‘earlier stages of the chain in Figure 7.1 (Niskanen 2003; Ramjerdi and Brundell-Freij, forthcoming). Some examples of key concepts are discussed below.

Asymmetric information

A specific issue of relevance for policy effectiveness and implementation is asymmetric information which is studied in behavioural and institutional economics. Asymmetric information includes a series of important problems for policy implementation. Typically the policy maker has an informational handicap when meeting with the involved parties. Other asymmetries relate to for example assessment of the quality of a product. This can be related to the selection of companies involved in the production of services in the transport sector. One example could be that a low quality, low price producers take over the market after a deregulation of say taxi service in a particular city. The consumers are unable to distinguish between high and low quality service (before buying the product). High quality service providers cannot credibly state that they are not low quality and thus the low quality service will drive the high quality service out of the market..

This can possibly be exemplified with the deregulation of taxi services in the Dublin area, as described by Longva and Bekken (2003). Here entry was deregulated in 2000 resulting in a massive increase in supply of taxies. As the price was kept regulated, and did not respond to an increase in operating costs, the average income per hour fell and the number of working hours needed to maintain a living increased from about 40 per week to an average of 60 hours per week. This again affected the quality of service provided. According to (Longva and Bekken, (2003), this has not been the general result from taxi deregulation in Europe.

Principal – Agent relations

Principal-agent relations also involve asymmetric information. This theory is very well described in Laffont and Tirole (1993). In a transport system setting the agent will typically be a company and the principal a public institution. The outline is a situation where the agent

has more information than the principal. The principal acknowledges this and is therefore confronted with the problem of accepting the proposal given from the agent at face value or to dismiss it. The agent will choose to give information according to what is most beneficial for the agent. So if it is beneficial for the agent to exaggerate its cost, he/she will do so. The solution of this problem can be to let the agent to choose from a menu of contracts that allow the principal to observe the cost-type of the agent. In other words the menu of contracts must allow the agent to earn some profit from its private information in order for the principal to get to know the cost structure of the agent. It is necessary for the principal to know the type of agent, in order to minimise his own principal's expenditure. In this way the non intentional effects are eliminated

An example of the principal-agent relationship is the relation between the authorities and the operating companies, under a tendering regime. Under such a regime various incentives and risk sharing arrangements can be made by the authorities in order to make the operating companies' best option to act in accordance with the authorities objectives.

Rent-seeking

Rent-seeking can be defined creating an income from seizing an income flow rather than creating one. In the private sector rent is often related to monopolistic behaviour. In rent-seeking terms the government can be seen as a creator of rents, and that those involved in government can seek rents wherever possible. Many problems that can be labelled rent-seeking are related to unintended policy effects. The term can be applied to many aspects, including policy making, policy implementation, and the behaviour of private actors in response to the policy.

Rent-seeking related to policy making can be both from the side of the politician and the bureaucrat, each seeking to extract rent from their position. This rent can take forms ranging from campaign funding, gifts, future career opportunities and bribes in exchange for 'special treatment' in other words rent creation (typically in the form of laws or regulations written in order to target a specific interest group (duly or unduly). Rent-seeking related to policy implementation, can involve searching for positions where there are possibilities to earn rents (in various forms) that are more attractive than the nominal position suggests. This can be bureaucratic positions which include the auctioning of subsidies or monopolies.

There are several ways to control rent-seeking, Hindriks and Mayles (2006) point at two. (1) A limit on the effort that can be put into rent-seeking. This can for example be a set of rules to improve transparency. (2) To restrict the process of rent creation. The most important principle here is the principle of equal treatment of economic actors, thus limiting the amount of rent that can be earned. A problem with both of these approaches is that there are several instances where differential treatment between actors, or some limits on transparency are due.

7.2.2 Political science

Political science and research is the last area we will consider. This field of research has originally its point of departure in the very opposite end to the instrumental types of research, namely in the phases *preceding* the policy measures and instruments; in the political system and its structures and actions. In fact political science did not traditionally pay too much attention to policy effects but was more concerned with the constitution and enactment of political power itself. Hence the first category of 'political acceptability' could be a topic on which this field had something to contribute.

However the last decades have seen a flourishing of research in policy making and implementation processes, and especially why policies do not always pass smoothly and unchanged from its genesis and design at the political level into the intended signals to the target groups of the policy (Winter 2003; 1990; Pressman and Wildavsky 1984). Implementation reach has become almost a sub-discipline of its own. Associated sub-disciplines such as policy analysis have further contributed to connect political studies with the field of practical policy assessment and hence even also to instrumental types of issues, in addition to traditional critical ones.

Implementation represents a significant critical phase in the policy process, and not as earlier believed a simple transmission tube. Hence the actors involved there are potential sources or generators of non and even counter intentional effects in comparison with what decision makers may have intended, and it is also a phase that may exert influence on what can be considered intentional versus non intentional in the first place

According to Winter (2003) Implementation process effects can be related to uncoordinated intra- or interorganisational behaviour; behaviour by street level bureaucrats (= front line staff with their own agenda or conditions); and by unexpected target group behaviour, for example efforts to evade or even counter the policy intervention (e.g. 'fuel tax protests').This reflects the position of the 'target group' as not only a passive, if crucial component to be captured in causal instrumental policy models but also potentially strategic factor in the production of unintended effects; connected to the fourth category 'feedback' in Merton's set (see chapter 3 Table 3.3). Inter- and intra-organisational behaviour refers to public agencies, but can also include private organisations in cases where such organisations have responsibility for the implementation process. Implementation processes may also involve unforeseen costs.

Related to the problem that the policy is aiming to solve, policy outcome effects designate the effects of changes in the behaviour of the target group brought about by the outputs. The target group of a given policy is not necessarily equal to the beneficiaries of the policy. Instead, they might be the ones that the policy sees as responsible for causing the problem at stake, e.g. measures to reduce traffic in a street to the benefit of the dwellers (e.g. noise) or children (e.g. traffic safety). Hence, it might be the target group's behaviour that needs to be changed in order for the group suffering from a given problem to benefit. The target group's reactions to output may be as expected, take on an unintended form, or indeed not take place at all (Sager 2007: 274). Among outcome effects of transport policy we find citizens acceptance and behaviour, as well as effectiveness of the policy.

Recent work by Flyvbjerg (2009), illustrates how non intentional effects can occur at a much earlier—but arguably no less important—phase: that of project planning and appraisal.

In lieu of the widespread adoption of New Public Management (NPM) philosophy during the 1980s and 1990s (Overman and Boyd, 1994), public contracts for transport infrastructure projects are commonly allocated to private actors on the basis of competitive tendering practices. The rationale behind this approach is well-known and a fundamental tenet of free-market economics; a competitive market is considered to lead to the most efficient use of scarce resources. The intended effect of the competitive tendering for public infrastructure projects is thus that the commissioning bodies commissioning the work receive greater value for money than they would otherwise enjoy if they undertook the work 'in-house'. The problem with this approach, as Flyvbjerg (2009, p. 352) observes in The Survival of the 'Unfittest', is that "strong interests and strong incentives exist at the project approval stage to present projects as favourably as possible—that is, with benefits emphasised and costs and risks de-emphasised", moreover, "local authorities, local developers and land owners, local labour unions, local politicians, local officials, local MPs, and consultants all stand to benefit from a project that looks favourable on paper and they have little incentive actively to avoid bias in estimates of benefits, costs, and risks." As interviews with promoters and forecasters revealed, for these actors, underestimating costs and overestimating benefits is, of course, a

rational approach to securing funding in a competitive market. Thus for Flyvbjerg (2009), the unintended adverse effect of current tendering and appraisal regimes is that, ceteris paribus, it is not the objectively 'best' proposals that are successful in bidding for public funds, but rather those that lead to the greatest cost overruns and benefit shortfalls in practice. Once again, this might be considered a primary counter intentional effect because it is detrimental to the very same objective that the policy of competitive tendering is designed to positively influence: efficient allocation of scare public resources.

Some of the observations of the political science perspectives may also be anaysed with economic concepts and vice versa.

Summary

In summary, various scientific disciplines offer different accounts and types of explanations of what may cause non-intentional effects of policies, from the instrumental effect models of natural and technical sciences revealing potentially invisible and distant impacts, over the complexity-dependent systemic and behavioural models of economics and other social/human sciences to the studies of implementation failures and asymmetric information of actors involved in the policy making process. Undertaken in political science and economics

The different disciplines cover different areas or similar areas with different lenses. All of them may be relevant for non-intentional effects of transport policy making.

7.3 Policy packaging in EU projects

In recent decades, a number of EU projects have directly and indirectly addressed issues of policy packaging. This section reviews nine projects that were undertaken during the 4th, 5th and 6th Framework Programmes—OPTIMA, POSSUM, TENASSESS, FATIMA, SAMI, SPECTRUM, TRANSPLUS, SUMMA, and TRANSFORUM—and provides a short synopsis for each, based upon their conclusions and recommendations. Reflecting the development of policy packaging processes over time, the projects are presented in chronological order.

OPTIMA - Optimisation of Policies for Transport Integration in Metropolitan Areas
Date: 1995 – 1997; FP: 4

The OPTIMA project attempted to identify optimal urban transport and land use strategies for a range of urban areas within the EU. Policy instruments at various levels and including management, land use, infrastructure and pricing measures were examined in this context. Based on case studies carried out on different European cities, general guidelines for urban transport policies within the EU were developed. Their conclusions for creating effective policies relating to urban transport were that strategies should be based on combinations of measures, and should draw fully on the synergy between successful measures. These measures relate to infrastructure measures, management measures, pricing measures and land use measures. They also conclude that when implementing policies and optimising procedures, careful thought must be given to the policy implications of each stage of the process. In addition, public acceptability will be a significant barrier with those measures which reduce service levels or increase costs which implies the need for effective public relations campaigns, and carefully designed implementation programmes.

POSSUM - Policy Scenarios for Sustainable Mobility
Date: 1996 – 1998; FP: 4

The goal of the POSSUM project was to construct scenarios for achieving the objectives of sustainable mobility and to assist the Commission in future decisions about the Common Transport Policy and the development of the Trans-European Networks. One special focus was on policy packages and how they can be created to increase their effectiveness and maximise synergies. Two approaches were chosen to create these packages: first, a more deductive, systematic approach based on the policy goals as a guideline to define the outline of the packages; and second, a more intuitive, inductive approach starting from the list of policy measures which allowed a creative process of inventing new combinations of policies. It was further acknowledged that some policies may have to evolve step by step and continuously be adapted to external factors that are more or less impossible to predict and manage. On the basis of the POSSUM project, Banister *et al*. (2000) published the book *European Transport Policy and Sustainable Mobility*. We draw heavily on this work in later sections.

TENASSESS - Policy Assessment of Trans-European Networks & Common Transport Policy
Date: 1996 – 1999; FP: 4

In TENASSESS a study of policy processes was carried out in order to support the assessment of policy and to collect empirical material for the development of two decision support tools: the TENASSESS Policy Assessment Tool and the TENASSESS Barrier Model. In the project, four ‘ideal type’ transport policy frameworks were distinguished: first, traditional transport planning with a regional focus and on infrastructure investments; second, as the traditional framework but with greater private sector involvement; third, a liberal approach with regulation through pricing mechanisms and taxation; fourth, an

ecological approach. While no policy framework belongs to only one of these types, they show the main cleavages between different national and EU transport policies. Three general conflict areas were identified for the implementation of the Common Transport Policy (CTP): first, conflicts about competencies on local, regional, national and European levels; second, thematic conflict relating to environmental vs. economic development; third, conflicts related to the re-structuring of the transport market.

FATIMA - Financial Assistance for Transport Integration in Metropolitan Areas
Date: 1997 – 1998
FP: 4

In the FATIMA project, while looking mainly at strategies for using private finance to support urban transport provision, a number of more general recommendations were given for policy makers for the design of optimal transport strategies. One was that strategies should be based on combinations of measures, and should draw fully on the synergy between successful measures. For formulating strategy/policy the following steps were recommended:

1. Clearly identify the policy objective(s);
2. Where a set of policy objectives is identified, indicate what the appropriate trade-off is between them (assuming, usually correctly, that they are to some extent in conflict);
3. Identify the set of policy measures which are to be considered, and which can be expected to have a strategic impact (in particular, list those which meet the latter requirement);
4. Specify the range(s) within which the measures in (3) can be applied, and the factors which limit that range (financial, political, legislative etc.);
5. Specify any other overall constraints (e.g. financial) on the specification of optimal strategies;
6. Employ a transport model which enables the full range of measures in (3) to be assessed against all the objectives (1), taking into account of all the user responses (mode, time of day, destination, frequency, route) of strategic relevance, and all the supply interactions (congestion, overcrowding, queuing) of strategic relevance;
7. Follow an optimisation procedure to identify the optimum, taking into account constraints where appropriate;
8. Check that this optimum is feasible and acceptable and modify if necessary;
9. Decide whether it is appropriate to use private finance or private sector operation, or both. If so, decide how best to employ them within the context of a socio-economically optimum strategy.

Of these steps, the most problematic in terms of practical transport policy-making were considered to be Steps 1 and 2, and it was argued that these should be given special attention by policy-makers.

The steps listed above implicitly assume that all policy impacts can be measured quantitatively and that transport models are available for predicting the levels of such impacts. If policy impacts that cannot be measured quantitatively are taken into account, a different approach, in which the optimisation process incorporates both fuzzy data and qualitative judgements, would be needed.

SAMI - Strategic Assessment Methodology for the Interaction of CTP Instruments
Date: 1997 – 2000; FP: 4

The objectives of the SAMI project were to develop an approach for setting targets for transport policy and provide a methodology and supporting software for selecting and evaluating packages of policy measures to reach those targets. In SAMI, the nature of

interaction between policy targets was determined according to three characteristics: direction, intensity and precedence. The ‘direction’ refers to whether the interaction is synergetic or contradictory, the ‘intensity’ describes the power of the interaction—if there is no intensity then there is no interaction between the targets—and ‘precedence’ refers to which of the targets generates a reaction in the other. This latter characteristic considered necessary because in many cases interactions between targets are not symmetrical, even though also symmetrical cases exist so that either target can generate a reaction on the other.

In addition such interactions can be characterised by ‘structural’, ‘circumstantial’ and ‘instrumental’ dimensions. A structural interaction is considered permanent, independent of the current positions and point of view, as well as of the orientations adopted for action in pursuit of those targets. One of the major factors contributing for a structural interaction is a strong commonality of stakeholders engaged (positively or negatively) in the two targets being considered. A ‘circumstantial’ interaction refers to a situation where a change in one of the targets would lead to changes in the direction and intensity of its interaction with the other. Finally, an ‘instrumental’ interaction means that the interaction between targets is likely to depend on the instruments or policy orientations adopted for their pursuit.

In the SAMI project, a quantitative planning approach was developed which aimed to determine the optimal level of instrument implementation in order to maximise specified social objectives. This is similar in nature to the methods reviewed in the OPTIMA project. Suitable policies were first selected from an inventory of policy options which contribute to one or more policy targets. Synergies between policies and feedback mechanisms between policies were then identified using expert groups. Subsequently, suitable policies were ranked in order to indicate their likely impact on each of the policy targets. From the highest-ranking policies, a ‘trigger policy’ was then selected – a policy which contributes significantly to the policy targets but which presents few major obstacles to implement. The trigger policy forms the basis for the construction of the policy package. Having identified the trigger policy, the process follows a series of similar stages where complementary policies are identified. In the first stage, one or more policies that are most complementary to the trigger policy are identified. In turn, for each of the complementary policies identified, one or more policies that are most complementary to them are identified.

SPECTRUM - Study of Policies Regarding Economic Instruments, Complementing Transport Regulation and the Undertaking of Physical Measures
Date: 1998 – 2002; FP: 5

In the SPECTRUM project, a more market-orientated approach to managing the transport network was explored. Case studies were carried out at both urban and interurban levels to provide quantified evidence on the performance of a range of economic and other instruments, whether implemented alone or in packages. Instrument performance when implemented in packages were categorised according to the following outcomes: complementarity, which exists when the use of two instruments gives greater total benefits than the use of either alone; additivity, which exists when the welfare gain from the use of two or more instruments in a policy package is equal to the sum of the welfare gain of using each in isolation; synergy, which occurs when the simultaneous use of two or more instruments gives a greater benefit than the sum of the benefits of using either one of them alone; decreasing returns, which occur when the welfare gain of the simultaneous use of A and B is smaller than the sum of the benefits of using either one of them alone; and incompatibility, which refers to a combination of instruments that does not lead to any welfare benefits and is not suitable for a combinatorial application. These definitions indicate the broad direction of interaction effects that may be seen to occur in practice through the implementation.

Instrument performance was also compared with respect to two other aspects: efficiency gains and feasibility issues. Efficiency was assessed by looking at economic efficiency in a strict sense (i.e. excluding external environmental, health, safety and security concerns) and equity (specifically, intergenerational equity). Feasibility considered five factors: political/cultural acceptability; legal/institutional acceptability; financial requirements; practical/technical requirements; and potential unintended effects. In addition, instruments or packages may involve a number of costs not reflected in the analysis, such as costs of monitoring and enforcement or public information costs. Considering efficiency and feasibility together the following conclusions were made:

1. In an urban context, economic instruments performed best overall when implemented in packages with other instruments, particularly those that involved improvements to public transport. Urban instruments performing less well overall included economic instruments implemented in isolation. In the interurban case, marginal cost pricing measures were performing best.
2. Overall it should be considered that policy instruments that provide efficiency gains without costs to a particular stakeholder or group are rare and possibly non-existent. For example changes in public transport fares would be at the cost of the operator, which may be unacceptable for privately operated public transport systems.
3. The key to a successful move towards a greater use of economic instruments would seem to lie in a package of measures where the costs are spread in such a way that the barriers on feasibility are low across the board and there is not a strong adverse impact on any single indicator.
4. Another issue is the maturity of the transport system. A system that is already mature (in the sense of levels of saturation, current instruments in use, levels of future demand and other factors) may have much to gain from a step change in management approach and be less resistant in terms of barriers.
5. There are situations when certain instruments that would optimise policy packages cannot be used due to restrictions, for example, inflexible legislation or public acceptability issues. A number of approaches can be used to reduce this problem: to combine restricted instruments in a policy package with publicly acceptable measures; to alter the rules in the framework to account for certain rules not being met due to restrictions in the use of instruments; and to substitute an alternative instrument for the restricted instrument.

TRANSPLUS - Achieving Sustainable Transport and Land Use with Integrated Policies
Date: 2000 – 2003; FP: 5

TRANSPLUS aimed at identifying best practice in the organisation of land use and transport policies in European cities and regions. It was recognised that the implementation of a land use and transport strategy usually implies the combination of several policy measures. It is assumed that the objectives can be achieved more effectively by using packages of policies, whereby the combination of complementary and mutually supportive measures facilitates their implementation and/or intensifies the respective impacts. Mutual interactions may be: benefit enhancing, insofar as a measure reinforces the benefits of another; acceptance enhancing, insofar as a measure makes another more acceptable for citizens and/or stakeholders (e.g. specific provisions to compensate losers); resource providing, insofar as a measure provides more financial or technical resources for the implementation of another measure; or simply logistical, insofar as they may represent a prerequisites for other measures.

The TRANSPLUS project further noted that to implement a land use and transport strategy does not simply require identifying a suitable list of policy measures. Rather, it involves the integration of several processes and actions into a coherent, and comprehensive framework that includes: deliberation, implementation, monitoring, evaluation, identification of

complementary policies, coordination between authorities at different levels of government and the participation of citizens and stakeholders.

Full policy integration requires activating this policy cycle and strengthening the links between different institutions with open and dynamic forms of co-operation. However, the real challenge is to maintain the coherence of the policy cycle over a long time period, involving different decision makers at neighbourhood, city, regional and national level, as well as ensuring the participation of relevant stakeholders and civil society. A number of activities which increase the likelihood of transferability and success were identified:

1. Collaboration: in some instances pairs or groups of cities will work together formally to develop similar systems and the transfer of innovation will take place through the structure of a specific project. These may include skills exchanges and staff secondments.
2. Networking: many cities participate in networks, facilitated by NGOs, where they gather to share experiences and transfer expertise through conferences, workshops and other media.
3. Dissemination: cities who have successfully implemented a new solution will disseminate their results to other cities through conferences and journals.
4. Osmosis: eventually an innovative solution becomes mainstream practice. At this point the process of transfer becomes hard to monitor, and further transfer takes place through a process of osmosis until the solution becomes standard practice.

The main purposes of such participatory approaches relate to: improving the quality of resulting plans and their effective implementation; developing common guidelines for action programs; avoiding and/or solving conflicts; raising awareness and encouraging changes in behaviour; and initiating the learning processes and social empowerment of the participants.

SUMMA - Sustainable Mobility, Policy Measures and Assessment
Date: 2003 – 2005; FP: 5

SUMMA was designed to support policymakers by providing them with a consistent framework for making trade-offs, where appropriate, among the economic, environmental and social components of sustainability. Although special focus of this project was on sustainability and all the challenges related to it in the context of mobility, many conclusions are relevant for policy measures in general as most problems are multidimensional. It was concluded in SUMMA that policy makers should try to develop policy packages to address the different dimensions of sustainability. Thus, policy measures should be dealt with in an integrated manner, as it is unlikely that any single policy measure can by itself help attain a sustainable transport system. Due to the complexity of some problems—e.g. CO_2 reduction—policy packages must often include a wider range of policy measures, for example, management of land use and technological development. In SUMMA a strong recommendation is given towards policies based on charges as opposed to policies based on subsidies, at the same time realising that the context of the policy must be considered as well.

SUMMA further noted that transport has both large positive and negative impacts. Thus, policymakers are faced with the conundrum of simultaneously stimulating the positive effects and mitigating the negative effects. The following factors are were deemed to be particularly significant:

1. The externalities, both the negative and positive environmental and social impacts, of transport are usually not included in the monetary calculations of transport costs. Thus, decision-makers lack information about the total effects of their decisions on the transport system and on society. Similarly, users do not have to pay for the

environmental and social damage resulting from their use of the transport system and their transport choices. Since information about, and awareness of the impacts costs is not complete, responsibility for the negative effects is not assigned to anyone, in short the costs of the negative impacts are ignored.

2. Transport and mobility are an integral part of society. Thus, it is extremely difficult to bring about changes in the transport choices made by people and in the functioning of the transport system and move towards a more sustainable transport system as long as changes are not made in the non-transport choices of people and in other sectors of the economy.
3. Existing structures are resistant to change. Innovations are only slowly adopted in the transport market and the capacity of the political system to reflect the increasing need for political measures is limited. Established structures also hold back behavioural patterns of transport choices from changing.
4. Finally, due to the fact that there are large and many positive and negative impacts of transport, there are also a number of conflicting interests: the interests of environment are in conflict with those of the economy and interests of individuals conflict with the interests of society as a whole. These differing interests disperse the willingness and capacity of the society to tackle the problems of the transport sector.

TRANSFORUM - Scientific Forum on Transport Forecast Validation and Policy Assessment
Date: 2005 – 2007; FP: 6

The TRANSFORUM project provided an overview and a forum for critical discussion about assessment methods and model development which part of projects in the Fourth, Fifth and Sixth Framework Programs. By screening EU policy instruments assessing FP projects, policy themes and issues were identified. From these, policy questions and, in turn, policy indicators were derived. These indicators were analysed as to their 'fitness for purpose' based on five criteria: whether the indicator was clearly derived from policy, whether it could be measured, whether data were available, whether it was suitable for forecasting, and whether they could be considered key indicators. Based on the analysis it was found that different indicators for policy objectives are used in almost all European projects, optimal indicators are used for project purposes and generally no clear description had been given as to how indicators were derived from policy objectives as formulated in policy documents.

A common set of indicators was presented for assessing EU policy. Even though they may not be suitable for assessing every possible policy, they may be used to assess common aspects in a consistent and comparable way. Four groups of indicators were defined for this purpose: core indicators for policy objectives, other indicators for policy objectives, indicators for policy measures and indicators for other 'contextual' factors. TRANSFORUM recommended that DG-TREN promote the use of a common set of indicators that can be regarded as fit for purpose for monitoring the current situation of social developments relevant to transport, the assessment of new transport policy packages, the monitoring of policy implementation and *ex-post* evaluation.

TRANSFORUM further noted that it is increasingly recognised that individual policy instruments should be combined into comprehensive policy packages. Two main reasons were believed to be responsible for this development: first, natural synergies may exist between individual instruments; and second, for reasons of public acceptability, packaging may be required in order to balance a potentially unpopular instrument (such as road pricing) with a popular instrument (such as improved public transport). When designing and selecting policy packages, it was argued that consideration needs to be paid to: the extent of the inventory of potential measures (i.e. has the widest possible range of instruments for packages been screened?); the basis for ranking and selecting policy packages (i.e. intuition/heuristics or a formalised selection framework); the potential interaction between policy instruments (i.e. synergetic and contradictory relationships); the method used for

developing policy packages (i.e. participative or otherwise); and the acceptability of instruments/ policy packages amongst various stakeholders. Finally, many barriers may prevent certain policy packages from being actually exploited, or implemented. Policy packages may appear too radical, and/or may simply raise extreme opposition amongst particular stakeholders.

7.4 OPTIC Workshop: feedback and response

7.4.1 Introduction

In order to receive valuable external perspectives on the content of this deliverable, an expert workshop was organised to test the proposed framework for policy packaging. The workshop took place in Brussels on 21 April 2010 and comprised an array of participants with backgrounds in academia, policy-making and the wider transport industry. After briefly describing the nature of the workshop activities, including a brief overview of the group exercise upon which many of the participants based their feedback, this appendix discusses a number of issues which arose from the workshop that we consider to be particularly significant. It is important to note, however, that the results of the workshop remain contingent on the setting, group composition and other constraints. Thus, the exercises undertaken cannot be viewed as analogous to the use of the proposed framework in the 'real world'.

7.4.2 Workshop overview

The workshop began with introductory presentations from the OPTIC team and a representative of the EC Directorate-General for Mobility and Transport. Following this, the proposed framework for policy packaging was presented, based primarily upon the content of Chapters 3 and 4 of this deliverable. At this stage, the workshop participants were encouraged to ask 'high-level' questions of the proposed framework, in order to ensure that the conceptual aspects of the approach had been adequately communicated.

Subsequently, the workshop participants were divided into three groups and asked to test an abridged version of the policy packaging framework in the context of a given policy problem. Given that the time available for the exercise was only 90 minutes, Phase 1 of the framework—determination of values, objectives and targets—was pre-specified for the participants (see Table 5.1). Also pre-specified were inventories of primary measures tailored to the nature of each group's transport domain and policy objective.

	Group 1	**Group 2**	**Group 3**
Transport domain	Urban transport	Long-distance passenger transport	Long-distance freight transport
Given policy objective	The reduction of traffic congestion	The revitalisation of rail transport	Optimising exisiting networks using intelligent transport systems

Table 7.1 Group characteristics in workshop exercise

For the participants, the principle goal of the exercise was to design an effective and efficient policy response to the problem using the proposed OPTIC framework. In essence, they were thus attempting to select a variety of policy measures which, taken together, would positively influence their given objective, whilst ensuring value for money and reducing the likelihood and extent of non-intentional effects. The process followed by the participants was strongly moderated by members of the OPTIC team to ensure that the proposed framework was

closely followed. This ensured that the feedback received remained relevant within the context of this deliverable.

In accordance with the packaging framework set out in Chapter 4, the workshop participants were first required to first select a primary measure from the inventory provided. Subsequently, and following the techniques discussed previously in Section 4.3.1, the causal reasoning underpinning the selection of their primary measure was explicated using a causal mapping approach. This mapping approach served two principle purposes: first, it provided a clear and comprehensible focal point around which the participants were able to debate and articulate their collective strategies for reaching the intended objective; second, it supported the participants' ability to predict the likely distributional effects of their strategies and the implications of their chosen measures with respect to non-intentional outcomes (Figure 7.2).

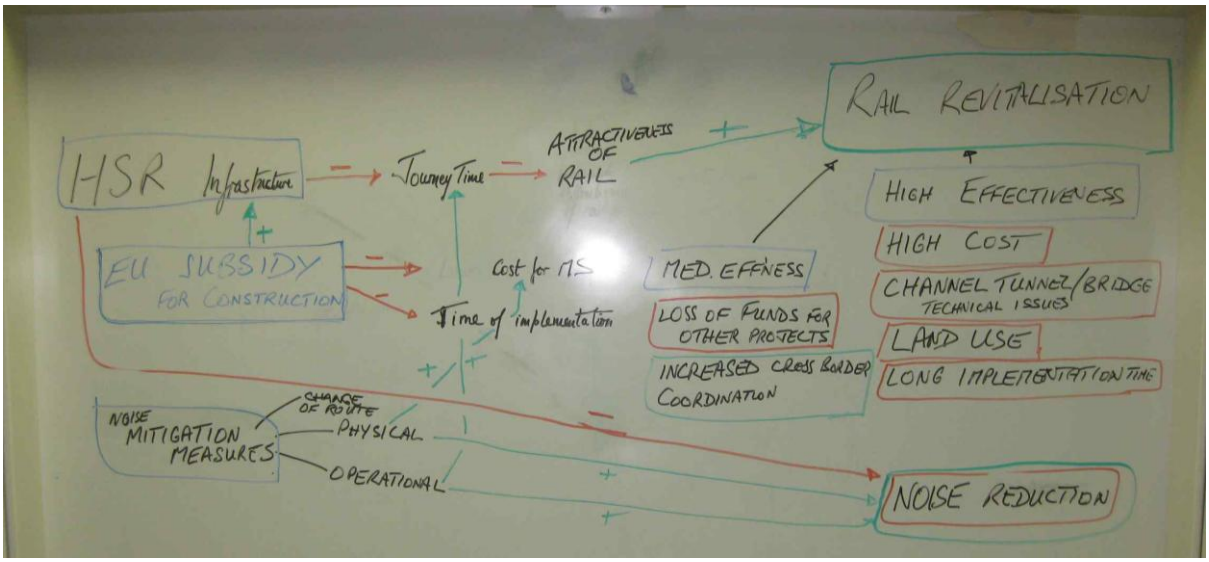

Figure 7.2 The causal mapping approach in use (long-distance passenger transport group)

Using the maps in this manner thus facilitated the next two stages of the exercise: first, evaluating the chosen measure with respect to its likely effectiveness, costs and key uncertainties; and second, evaluating the measure with respect to the likely presence of unintended effects. This analysis was also supported with the use of actor assessment tables, as described in Section 4.3.2 (Figure 7.3). In light of the evaluation, and in accordance with the OPTIC framework, the participants in all three groups opted to complement their primary measures with additional measures.

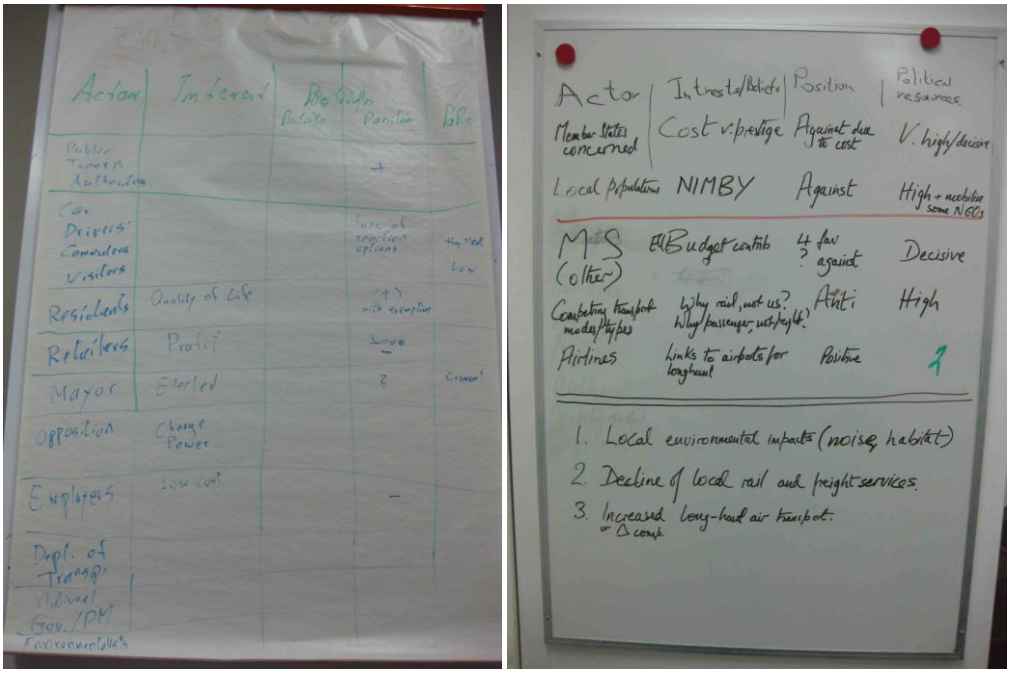

Figure 7.3 The actor assessment tables in use (urban and passenger transport groups)

Obviously, time constraints prevented a truly comprehensive appraisal of the framework. Nevertheless, the exercise involving the abridged version proved to be a valuable means of stimulating discussion as to the merits and limitations of the approach to policy packaging outlined in this deliverable. Following the exercise, the participants were given time to reflect upon their experiences. In particular, we asked to answer two key questions:

1) To what extent is our policy packaging framework likely to be useful 'in the field'?

And

2) Are the elements and stages present in the process sufficient, or are some useful aspects missing?

A representative from each of the three groups acted as a rapporteur and discussed the collective responses to these questions in a final afternoon panel discussion chaired by OPTIC. This panel discussion also enabled the OPTIC team to receive feedback on the draft version of Deliverable 1 from selected participants who had been sent advance copies.

7.4.3 Significant themes

As with all such participatory events, many comments, questions and recommendations were made throughout the workshop, during both the group exercises and the final panel discussion. Some of these related to issues with which the OPTIC team were already familiar and this served to strengthen our resolve to ensure that the proposed policy packaging framework can be clearly communicated to a range of audiences. However, given the range of viewpoints afforded by the workshop participants' diverse professional roles, some of the comments received highlighted issues which the OPTIC team had yet to sufficiently acknowledge. Specifically, the workshop served to illustrate those issues which were deemed particularly significant by key stakeholders, which the remainder of this section shall discuss.

System boundaries and critical paths

Despite the fact that it only lasted for a short while, the group exercises convincingly demonstrated the complexity of contemporary policy-making. The causal maps generated by the participants developed rapidly from a relatively simple cause and effect relationship between the primary measure and the policy objective, to an intricate web of relationships connecting an extraordinarily wide variety of economic, social and environment variables.

Given OPTIC's focus on the interrelationships between policy measures and efforts to mitigate the adverse implications of unintended effects, it is clearly encouraging that the issue of complexity in policy-making came to the fore in the workshop. However, while it may be admirable to acknowledge the presence of complexity in contemporary transport policy-making, recognition *per se* is clearly insufficient as a means of supporting high-quality political decision-making. In other words, whilst it is helpful to *understand* policy domains as complex phenomena, policy-makers must also be able to *manage* change in complex policy domains.

There is thus a need to strike a balance between recognising and interrogating the complexity of transport problems, and limiting this complexity to a level which decision-making can realistically proceed. On the one hand, too much complexity may lead to data overload and paralysis of decision-making. On the other, an overly-simple model of a policy domain is likely to narrow the scope of relevant knowledge to such a degree that the effectiveness and efficiency of a policy package will be severely undermined. Moreover, as demonstrated in Section 4.3.3, reducing the breadth of actors' understanding would both increase the likelihood of non-intentional effects as well as limiting policy-makers' capacity to effectively mitigate such effects when they occur. In essence, there currently appears to be an inverse relationship between the degree of complexity recognised in the analysis of a transport policy problem, and the resultant capacity of policy-makers to adequately respond with an effective and efficient intervention. This is naturally exacerbated by OPTIC's inter-modal and inter-jurisdictional scope.

So what can be done to move beyond this problem? How can analysts recognise complexity and at the same time make effective interventions? The answer, broadly, relates to appraisal of the causal relationships and, specifically, to the identification of critical paths. Fundamentally, the numerous variables in the causal map of a potential intervention will differ in terms of their relative importance; some variables will be highly significant in the context of the intervention, while others may be relatively peripheral to the key issues of concern.[15] Bearing in mind the need for decision-makers in one jurisdictional domain to pay heed to the implications of their decisions elsewhere, there is thus a need to focus analysts' efforts on those variables which are both particularly significant and which fall under their jurisdictional sphere of influence. Weighting the variables in this manner is likely to be a resource-intensive process, although it could be facilitated through the use of decision-support systems.

Integration of modelling and quantitative assessment

As the variables in the analysis vary in significance, so the relationships that link them also vary in terms of magnitude. Ensuring that the characteristics of these relationships are accurately known is clearly vital if policy-makers are able to make informed decisions about the best way to reach a given objective (i.e. through the ranking of alternative options). It is important to stress, therefore, that the causal mapping is subsequently to be supported by quantitative analysis. This will be crucial in order to limit the uncertainty in the causal maps

[15] However, it must be remembered that the degree of 'importance' will be relative to actors' positionality. This has implications for jurisdictional issues. Health etc...

and thus to support the identification and analysis of critical paths amongst the complex array of variables present.

Key to this process will be the integration of quantitative and qualitative methods. We very much agree with feedback from the workshop that this may be best facilitated through a series of iterative steps, whereby quantitative techniques are used to clarify and assess initial qualitative assumptions, with the quantitative output of such assessment forming the basis for further qualitative reflection and discussion. As we see it, this would have two principle benefits: first, it would help to identify the most significant variables in the complex causal models, helping to identify critical paths; second, it would give greater confidence with respect to the relationships between these variables. Together, this knowledge would enhance the overall quality of the packaging process, giving confidence to results and facilitating the comparative assessment of different policy packages.

Following feedback from the workshop, we have updated the content of Section 4.3.2 to ensure that it explicitly highlights the role of modelling in the policy packaging framework. In addition, Work Package 3 in the OPTIC project will critically evaluate the capabilities of existing models to support the packaging process as outlined in this deliverable.

Defining objectives

As stressed in Section 4.3.1, the workshop highlighted the importance of setting clear policy objectives, complemented by measurable policy targets at the outset of the policy packaging process. This was argued to be crucial if subsequent policy packaging efforts are to be meaningfully evaluated. Furthermore, participants noted the importance of ensuring that the inventory of measures created in Phase 2 of the framework is as comprehensive as possible. In particular, it was recommended that each measure in the inventory be assessed against a range of relevant criteria such as its likely effectiveness, its propensity to cause non-intentional effects and its major distributional effects. In line with the iterative nature of the framework, this could initially be based upon proxy indicators and subsequently updated following quantitative analyses described above.

Guidance and structure

The nature of the group exercises undertaken in the workshop illustrated that the guidance provided by OPTIC was only partially able to ensure that the proposed framework could be followed by policy-makers independent of OPTIC moderation. In part, this resulted from the nature of the group dynamics and reluctance on the part of some participants to fully engage with the format of the process, as denoted in the guidance material provided. However, it is clear that this guidance could be improved. In particular, it was felt that a greater degree of prescription would be of benefit, as would a more formal approach.

It is, of course, always difficult to represent and communicate the nature of a dynamic process in the form of guidance material. This is particularly evident in the case of the policy packaging framework where there is a definite tension between the iterative, theoretical approach outlined and the inevitable changes that this approach will undergo in order to be practically applied. For example, Phases 3a and 3b in the framework are to be considered as parallel processes, yet unless significant resources are available, in practice these would proceed sequentially. The famous ‘chicken and egg’ analogy is useful here: we want to create both effective and acceptable policy packages. If one starts the process with a concern only for measures that are effective, it is almost certain that some will subsequently prove to be unacceptable, and one could argue that this is a waste of resources. However, if one starts the process with a concern only for measures which are acceptable, there is a genuine risk that many will prove to be ineffective and one may also dismiss measures which are likely to be highly effective yet unacceptable. There is no straightforward solution

to this issue of translation and communication. The OPTIC team can only strive to develop clear, prescriptive guidance which is sensitive to the practicalities of policy-making.

In addition, the workshop also highlighted the need to acknowledge the salience of organisational dynamics and the positionality of decision-makers in the overall policy process. Although ostensibly similar to issues of jurisdiction and responsibility mentioned throughout this deliverable, this pertains directly to the capacity of policy-making bodies, such as the European Commission, to *facilitate* the processes of policy packaging that we have outlined within the organisation. These are not completely new issues for the OPTIC project to take into account, but rather they demonstrate the need to acknowledge issues of implementability at a broader range of scales than has previously been recognised. The business strategy methodology *Six Sigma* was recommended as a potentially useful instrument with which to clarify the optimal organisational environment for high-quality policy packaging processes. Initial consultation of the academic literature on *Six Sigma* certainly appears to indicate that it can provide valuable insight into the nature of organisational dynamics (see, for example, Schroeder *et al*., 2008; Anthony and Banuelas, 2002).

While the proposed framework aims to address most of the elements and stages involved in the process of policy packaging, it does not address the 'space' nor the 'actors' directly involved in conducting the process. This is crucial, as it is not only the outside 'political' world which shapes eventual policy, but very much also the internal dynamics and actors within the organisation, indeed the unit within it, responsible for designing the package. In this respect, it is useful to draw from the experience of commercial companies who are faced with similar challenges and the way this is handled within the organisation. The literature on 'total quality management', and more recently *Six Sigma*, is certainly useful here although such instruments must remain sensitive to the everyday realities of policy making.

Stakeholder engagement

Finally, the role of non-policy stakeholders in the policy packaging process was also raised by a number of participants. The discussion essentially hinged upon one question: to what extent should external stakeholders (e.g. industry bodies, haulage companies, airlines) play a role in developing policy packages? Official approaches to policy-making often play down the involvement of such actors in the formative stages of policy design. The rationale for this is highly understandable, both for reasons of pragmatism and democratic ethics. However, it is no secret that many regulatory measures stem from industry demands (e.g. rent seeking behaviour; demand for fair competition/ access to markets; or consumers demanding protection/rights). The case for greater stakeholder engagement in the policy packaging process was made in the workshop. Not least, it was argued that stakeholders have unparalleled insight into the nature of the transport systems as they are manifested in everyday personal and business practices. Hence, their knowledge of the subtleties and nuances of the transport system may well create a much richer and more detailed causal map of the policy intervention in question. This was thought to be particularly valuable with regard to the *ex-ante* identification of non-intentional effects. Clearly, however, although external stakeholders offer valuable knowledge and experience to the process, it would be naive to imagine that their contribution to policy-making would not be guided in some way by their private agendas. Hence, their involvement must be managed in a specific and strategic manner. One potential approach could involved setting up 'closed fora', where stakeholders are able to speak frankly about their experience without overly influencing the decision-making process.

7.4.4 Concluding remarks

The policy packaging workshop was a valuable and insightful event which highlighted many of the strengths and limitations of the framework outlined in this deliverable. The participants' comments and recommendations have been acknowledged and will doubtless offer valuable guidance to the OPTIC team as the project progresses. Finally, it should be noted that the typology of non-intentional effects outlined in Chapter 3, although presented at the workshop, generated little in the way of critical feedback—either positive or negative. As this typology is central to the project's development, we envisage that future discussions with external stakeholders may focus on this issue in greater depth.